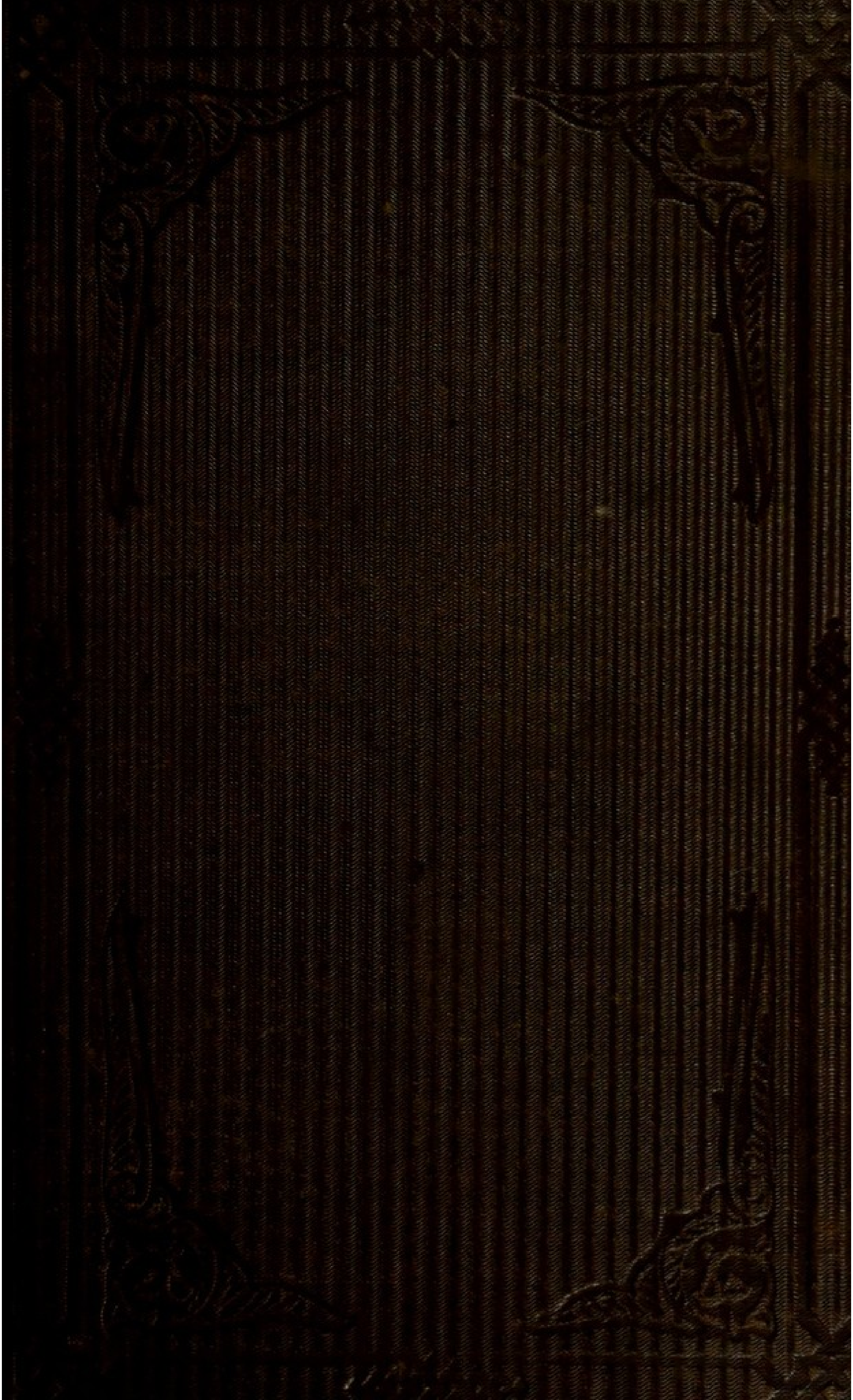
Translation of the Pharmacopoeia of the Royal College of Physicians, of London, 1851 : with notes and illustrations / by Richard Phillips.



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CAR. I. TABORIS.

TRANSLATION

OF THE

PHARMACOPŒIA

OF THE

ROYAL COLLEGE OF PHYSICIANS
OF LONDON,

1851.

WITH NOTES AND ILLUSTRATIONS.

BY

RICHARD PHILLIPS, F.R.S. L. & E., F.G.S.,
LATE PRESIDENT OF THE CHEMICAL SOCIETY,
CURATOR OF THE MUSEUM OF PRACTICAL GEOLOGY, ETC.

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TO

JOHN AYRTON PARIS, M.D. CANTAB.,

HON. D.C.L. OXON., F.R.S.,
PRESIDENT OF THE ROYAL COLLEGE OF PHYSICIANS,

IN MEMORY OF

A LONG ENDURING AND HONOURABLE FRIENDSHIP,

THIS BOOK,

IN ACCORDANCE WITH THE EXPRESSED INTENTION OF

THE AUTHOR,

IS INSCRIBED,

WITH THE PROFOUNDEST RESPECT,

BY THE EDITOR.

PREFACE.

As nearly fourteen years have elapsed since the last correction and emendation of our Pharmacopœia, many circumstances have at length induced us to resume the undertaking.

If, in any manner, we have conferred a benefit on the Public by this issue of a new edition, we must acknowledge our obligations to our predecessors in the work, as having both incited us by their example and instructed us by their labours. Still however, we are desirous of prefixing a few observations, not so much with the intention of discussing the whole subject matter of the book, as of elucidating and supporting if requisite by argument, whatever it may appear to contain presenting any novelty or ambiguity. First of all, then, it is to be remarked, that we have classed several medicines in the earlier division of the work which were formerly placed in the second part; as to those which are carefully and correctly prepared by manufacturing chemists, we think it better to enumerate and describe them, rather than to explain the system and method of preparation, inasmuch as we have these medicines so adapted to our use, that we have no occasion to prepare them ourselves. If, however, we have thought it judicious to explain the modes of making certain preparations, which are carefully prepared by these operative chemists, such, for instance, as the Chloride and Bichloride of Mercury, we have done so for this reason, that every one might have at hand the proper formulæ for those remedies, which, whilst they are most powerful and efficacious, are at the same time easiest of preparation; especially should there be any difficulty in procuring them, or any suspicion of the purity of those offered for sale. But although we have devoted the utmost care and attention in our power to the methods of obtaining these, and all our other preparations, we are aware that skilful chemists, who understand their profession, may attain the same results by less expensive, or even by more convenient processes. But with respect to what may be accomplished by others, it seems but right to require that the same tests should be applied to their preparations, as those by which the purity of our own is ascertained, and that the employment of those medicines should be forbidden which will not stand this ordeal.

We have added to our former list certain new medicinal agents, both simple and compounded, of which long experience has proved the efficacy. If there be any tests which have not hitherto been mentioned in the Pharmacopœia, but which are serviceable in ascertaining the purity of any substance, we have inserted them in their proper places as notes to the text.

Although the organization of vegetable matter is chiefly distinguishable from that of metals, in that whatever is derived from the former as applicable to medicinal uses, is less easily defined with brevity; still we have not thought it right to pass over altogether this, the more difficult portion of our undertaking, especially since it is of the greatest consequence to explain the precise meaning of every term which occurs in this Pharmacopœia, lest any ambiguity should arise from various substances being included under the same appellation.

We have been unwilling incautiously to change the names of those medicines which are in ordinary use, for these terms have been, for the most part, either scientifically adopted by our predecessors, or have the sanction of long usage. At the same time we are aware that whatever knowledge has been acquired by the advancement of science should be comprehended in our nomenclature; only taking care, in our choice or invention of new names, to take nothing for granted which still remains uncertain and unestablished; for we ought to follow in the track of natural history rather than to outstep it. Be that as it may, we have so placed the former names in juxtaposition with the new, that no one can fail to see what changes have been made.

In conclusion, we hope that our Pharmacopœia, being based upon these principles, will be found to embody all the advantages which result both from ancient observation and modern discovery ; so that while it contains nothing repugnant to the opinions of experienced practitioners of medicine, it may prove advantageous to the younger students by instructing them in the materials they should employ, and also be serviceable to the compounders and retailers of medicines, by neither imposing nor enforcing unreasonable nor unnecessary restrictions.

ADVERTISEMENT.

A portion of this Work, on the completion of which the Author had been laboriously engaged within a few days only of his decease, had been already consigned to the press, when his Widow and Executrix placed in my hands the copious Manuscript and Explanatory Notes of my late highly valued friend and former teacher, in order that I might superintend its passage through the Press.

For the grateful task of editing this, the Author's last Work, I possessed both the requisite leisure, and a long-standing acquaintance with his scientific views and methods of investigation; and most amply shall I be rewarded should I be deemed to have discharged this duty, without detracting from the well-established reputation of the Work.

I may perhaps be allowed to state that the Author, at the request of a Committee of the Royal College of Physicians appointed to revise their Pharmacopœia, either conducted or inspected the preparation of most of the medicines which have been introduced, or the methods of preparing which have been altered in the present Pharmacopœia.

In the Remarks which accompany this Translation, the Author's attention and my own have been especially directed to those engaged in the practice of Physic, but who from the demands of their professional avocations have not watched the important and rapid progress of chemical science; to Medical Students, to whom concise yet distinct descriptions of the chemical changes which occur during the preparation of medicines are extremely useful; and lastly, to those engaged in the preparation and dispensing of drugs, to whom methods of ascertaining the purity and freedom from adulteration of the materials they employ will prove advantageous. To the directions and tests of the Pharmacopœia such remarks have been added as seemed to further the purpose of their introduction, and the tests which have been proposed are the more necessary because the College no longer insist that the medicines which they have ordered should be prepared exactly in the mode prescribed, provided they will stand the trial of their purity to which they should be submitted.

They who know how small that portion of time is which the student of medicine has at his disposal for the acquirement of chemical and pharmaceutical knowledge, will readily admit the utility of assisting his progress by familiar modes of illustration. With this view much use has been made of diagrams in this work, and for an example of the method of framing them I refer to those which occur in pp. 309–10, illustrating the preparation of Chloride of Mercury. The materials employed and waste products, as Sulphuric Acid and Sulphate of Soda, are printed in the usual type; the constituents of the materials in italics, as *Oxygen* and *Sodium*; the intermediate products, when such occur, in very small type, as Sulphate of Mercury; and the Pharmacopœia preparation in small capitals, as CHLORIDE OF MERCURY.

I have deemed it my duty, so far as I was able, strictly to carry out the Author's design of making the present Work a Compendium of whatever is yet known respecting the more important chemical properties of every substance and preparation inserted in the Pharmacopœia, and therefore whenever an article of the Materia Medica is used in a preparation its chemical and physical history is given, either under the first, or the most important preparation in which it occurs; thus, the descriptions of the Cinchona barks and of the alkaloids derived from them are appended to Decoctions of Cinchona, those of Tartaric acid and of its potash salts occur under Potassio-tartrate of Antimony, and Tannic and Gallic Acids under Tincture of Galls; an arrangement which is not only a rational one, but is also convenient and instructive to the Student. Whatever defects this arrangement may be chargeable with, I trust will be at least compensated by the copious index annexed to this book. Several processes which occurred in the last Pharmacopœia, the products of which are now inserted in Materia Medica, are retained in this Work, as not only being useful to those practitioners who may be desirous of preparing their own chemicals, but also frequently affording excellent practice for the student in operative chemistry and pharmacy in the use and management of chemicals and of apparatus: these re-inserted formulæ are invariably printed in italics; but the former Pharmacopœia processes have not always been restored, for if obviously better methods, as in Liquor Ammoniæ, p. 103, have come under my notice, these have been preferred and are printed in similar type to that of the rest of the notes and remarks.

Symbols and formulæ of the definite chemical products and compounds have been given, and these formulæ have been adopted in the Table of Equivalents appended to this Work, as they not only denote the ultimate composition of the substances contained in the Table, but they will also enable students to familiarize themselves with the use and employment of chemical symbols and formulæ.

I have freely availed myself in this work of the views and results of chemists, and of the labours of various writers on Materia Medica and Pharmacy, and have adopted whatever information I have met with of a reliable and suitable kind frequently without specific acknowledgment of its source, as will be evident to all who are versed in these departments of science.

Well knowing how necessary it is that the student should be acquainted with the powers and doses of medicines, I have generally given an account of them; but not being a medical practitioner, I have consulted and quoted the best authorities on the subject; and it may inspire confidence in this statement to observe, that these have been for the most part transferred from the translation of the last Pharmacopœia, for which the Author was then chiefly indebted to the friendly assistance of the President of the College of Physicians, and to Dr. Hue of St. Bartholomew's Hospital. My most emphatic thanks are due to Mr. Warington of Apothecaries' Hall, for the valuable information and efficient aid he has constantly afforded me whilst this Work was passing through the Press.

J. DENHAM SMITH.

Putney, September 1851.

CONTENTS.

PART I.—MATERIA MEDICA.

ERRATA.

This List contains a few corrections of some of the formulæ of the Preparations, to which the reader's attention is especially requested.

Page 10, line 5, for *Ferri* read *Antimonii.*
— 24, — 17, for *Hydrargyri Iodidum* read *Syrupus Ferri Iodidi.*
— 30, — 15, for *Ferri* read *Antimonii.*
— 34, — 20, *after* acid *insert* chloride of barium being added.
— 81, — 32, for *Oxide of Ether* read *Oxide of Ethyl.*
— 88, — 38, *insert* Tinctura Ergotæ Ætherea.
— 94, — 5 from bottom, for *twenty-seven* read *twenty-eight.*
— 108, — 7 from bottom, *for* Oxydum *read* Oxidum.
— 116, — 25, *for* Pilulæ *and* Compositæ *read* Pilula *and* Composita.
— 139, — 8, *dele* "stronger."
— 150, — 1, *insert* fresh *after* Take of.
— 162, — 9 from bottom, *for* $2C^{20} H^{12} NO^2, SO^3, 8HO$ *read* $SO^3, 2CO^{20} H^{12} NO^2, 8HO$.
— 167, — 16, *for* two *read* ten.
— 170, — 8 from bottom, *dele* boiling.
— 173, — 7, *for* Spiritûs Juniperi Compositum *read* Spiritus Juniperi Compositus.
— 184, — 8 from bottom, *for* in the bases *read* as the basis.
— 196, — 7 from bottom, *for* gallons *read* pints.
— 201. *In formula for Extract of Gentian, for* gallons *read* pints *throughout.*
— 205, line 25, *for* $C^{20} H^7 O^7$ *read* $C^{20} H^8 O^7$.
— 242, — 10, *for* $2CuO, C^4 H^3 O^3, 6HO$ *read* $C^4 H^3 O^3, 2CuO, 6HO$.
— 252, — 13, *for* 76 *read* 476.
— 283, — 1, *dele* and the only.
— 284, — 12, *for* $CuO, 2NH^3, SO^3, HO$ *read* $CuO, SO^3, 2NH^3; HO$.
— 292, — 28, *for* IODIDUM *read* IODIDI.
— 330, — 31, *for* Composita *read* Compositum.
— 355, — 2, for *SODA* read *SODIUM.*
— 359, — 10 from bottom, *for* $2NaO, CO^2; KO, CO^2; 18HO$ *read* $KO, CO^2; 2NaO, CO^2; 18HO$.
— 376, — 25, *for* an analysis of the Editor *read* the Editor's analysis.
— 422, — 3 from bottom, *insert* 8 *after* "Oxygen."
— 426, — 21, *for* iodine *read* iodide of sulphur.
— 438, — 16 *dele* boiling.
— 505, *last line, for* tis *read* its.

THE
LONDON PHARMACOPŒIA.

WEIGHTS, MEASURES, ETC.

TWO kinds of Weights are used in England; by one of which gold and silver, and by the other nearly all other kinds of merchandize are valued: we employ the former, which is also called *Troy Weight*; and we divide the pound thus, viz.

The Pound	℔	contains	Twelve Ounces, ℥ xij.
— Ounce	℥		Eight Drachms, ʒ viij.
— Drachm	ʒ		Three Scruples, ℈ iij.
— Scruple	℈		Twenty Grains, gr. xx.
— Grain	gr.		

We have added the signs by which each weight is usually denoted.

We use Measures of Liquids derived from the gallon defined by the laws of the kingdom: this for medicinal purposes we divide thus, viz.

The Gallon	C	contains	Eight Pints, O viij.
— Pint	O		Twenty Fluidounces, f℥ xx.
— Fluidounce	f℥		Eight Fluidrachms, fʒ viij.
— Fluidrachm	fʒ		Sixty Minims, ♏ lx.
— Minim	♏		

We have added the signs by which we denote each measure.

Care is to be taken that medicines do not acquire any impurity from the Material of the Vessels in which they are either prepared or kept; wherefore, unless it be otherwise ordered, we direct glass or vitrified vessels to be employed; and those we regard as properly vitrified which are in English commonly called *Porcelain* or *Stoneware*. But it is to be scrupulously attended to, that no earthen vessels be employed whose surface is glazed with lead.

All acid, alkaline, or metallic preparations, and salts of every kind, ought to be kept in stopped glass bottles.

With some preparations it is proper that they should be of black or green glass.

Wherever the SATURATION of acids or alkalis is mentioned, we direct it to be ascertained whether it be perfect or not, by means of litmus and turmeric, in the mode adopted by chemists. And when in order to saturate an acid, crystals of carbonate of soda dissolved in water are added to it, it is necessary that all the carbonic acid should be first expelled with the aid of heat. In applying tests, distilled water is to be employed. Unless it be otherwise ordered, white bibulous paper is to be used in straining liquors and in drying crystals.

We measure the DEGREE OF HEAT by *Fahrenheit's* thermometer. When we direct a BOILING HEAT, we mean that of 212°. But we call a GENTLE HEAT, that which is denoted by any degree between 90° and 100°.

Whenever SPECIFIC GRAVITY is mentioned, we assume the substance treated of to be of the temperature of 62°.

Whenever the WEIGHT OF ANY PRECIPITATE is mentioned, we understand, that the substance by which it was precipitated has been added in excess, and the precipitate well washed, and unless otherwise stated, dried at 212°. But care is to be taken lest, as sometimes happens, the precipitate be redissolved by the precipitant being added in excess.

When CRUCIBLES are required, we direct those to be employed which are Hessian or Cornish.

A WATER BATH is made, when any substance contained in a proper vessel is exposed either to hot water, or the vapour of boiling water.

A SAND BATH is made of sand to be gradually heated, in which anything is placed, contained in a proper vessel.

TROY OR APOTHECARIES WEIGHT.

Pound.		Ounces.		Drachms.		Scruples.		Grains.
1	=	12	=	96	=	288	=	5760
		1	=	8	=	24	=	480
				1	=	3	=	60
						1	=	20

AVOIRDUPOIS WEIGHT.

Pound.		Ounces.		Drachms.		Grains.
1	=	16	=	256	=	7000
		1	=	16	=	437·5
				1	=	27·34375

IMPERIAL MEASURE.

Gallon.		Pints.		Fluidounces.		Fluidrachms.		Minims.
1	=	8	=	160	=	1280	=	76800
		1	=	20	=	160	=	9600
				1	=	8	=	480
						1	=	60

Weight of water at 62°.	Avoir. lbs.	oz.		Grains.		Cubic inches.
Imperial Gallon . .	= 10	0	=	70000	=	277·273843570
Imperial Pint . . .	= 1	4	=	8750	=	34·659230446
Imperial Fluidounce	=	1	=	437·5	=	1·732961522
Imperial Fluidrachm	=			54·7	=	0·216620190
Imperial Minim . .	=			·91	=	0·003610335

Pharmacopoeias before 1836.

WINE MEASURE.

Gallon.		Pints.		Fluidounces.		Fluidrachms.		Minims.
1	=	8	=	128	=	1024	=	61440
		1	=	16	=	128	=	7680
				1	=	8	=	480
						1	=	60

Weight of water at 62°.	Avoir. lbs.	oz.	grs.		Grains.		Cubic inches.
Wine Gallon . . .	= 8	5¼	21	=	58318	=	231
Wine Pint	= 1	0½	71	=	7290	=	28·875
Wine Fluidounce .	=	1	18	=	455·6	=	1·805
Wine Fluidrachm.	=				57	=	0·226
Wine Minim . . .	=				·95	=	0·004

IMPERIAL compared with WINE MEASURE.

	Gallon.	Pints.	Fluidounces.	Fluidrachms.	Minims.
Gallon . . . =	1	1	9	5	8
Pint . . . . . =		1	3	1	38
Fluidounce . =				7	41
Fluidrachm . =					58
Minim . . . =					0·96

WINE compared with IMPERIAL MEASURE.

	Pints.	Fluidounces.	Fluidrachms.	Minims.
Gallon . . . . . =	6	13	2	22
Pint . . . . . . =		16	5	18
Fluidounce. . . =		1	0	20
Fluidrachm . . =			1	2·5
Minim . . . . . =				1·04

One cubic inch of Water at 62° F. weighs 252·458 grains.

In this table, except in particular instances, fractions of a grain or of a minim, greater than half, are reckoned as one, and omitted when less.

PART I.

MATERIA MEDICA,

COMPRISING ANIMAL, VEGETABLE AND CHEMICAL SUBSTANCES, WHICH WE DIRECT TO BE EMPLOYED EITHER IN CURING DISEASES OR IN FORMING MEDICINES; WHETHER THEY EXIST NATURALLY, OR ARE PREPARED WHOLESALE IN CHEMICAL MANUFACTORIES, OR ELSEWHERE.

OF THE COLLECTING AND PRESERVING OF VEGETABLES.

Vegetables are to be collected in dry weather, when wet neither with showers nor dew. They are to be collected annually, and are not to be kept beyond a year.

Most Roots and Rootstocks are to be dug up when the old leaves and stalks have fallen and before the new ones have appeared.

Barks ought to be collected at that season in which they can be most easily separated from the wood.

Herbs and Leaves are to be gathered after the flowers are blown, and before the seeds have ripened.

Flowers are to be gathered recently blown.

Fruits and Seeds are to be gathered when ripe.

The parts of vegetables, unless we have directed otherwise, are to be kept dried for use. Those which are to be dried are to be put into very shallow wicker baskets soon after they are gathered, exposed to a gentle heat and a current of air, and kept from the light: when the moisture is expelled, increase the heat gradually to one hundred and fifty degrees, that they may be dried. Lastly, preserve the more delicate parts, as the flowers and leaves, in well closed black glass bottles, and the other parts in proper vessels in such a manner as to prevent the access of light and moisture.

CATALOGUE.

In the first column are placed the names of substances, which are generally simple and in use, common, short, and well adapted to the formulæ of prescriptions; in the other column, unless it be otherwise indicated, the names of Animals are quoted from Cuvier; of Vegetables, from Linnæus or De Candolle. Chemical substances are described by modern names.

Absinthium, *Common Wormwood.*	Artemisia Absinthium, *The Herb in flower.*
Acacia, *Acacia.*	Acaciæ species variæ, *Various species of Acacia. The gum exuded from the bark, indurated by exposure to the air.*

Whitish or yellowish, transparent, or cracked and opaque, brittle, and very soluble in water.

Acetum (*Britannicum*), *Vinegar* (*British*).	Acetic Acid *dilute, and impure, prepared by fermentation from an infusion of malt.*

Brownish, of a peculiar odour, specific gravity 1·019; a fluidounce of vinegar is saturated by a drachm of the crystals of carbonate of soda. If to the same measure there be added ten minims of solution of chloride of barium, and more chloride be dropped into the filtered vinegar, nothing further is precipitated. Hydrosulphuric acid being added, its colour is not altered.

Remarks.—The strongest vinegar contains 5 per cent. of real acetic acid; usually it does not exceed 4·6 per cent.; a fluidounce weighs about 446 grains, saturating, when of the strength last mentioned, 58 grains of carbonate of soda; and two grains of it, making up the drachm, are allowed for saturating the sulphuric acid permitted to be mixed with the vinegar, and for decomposing the accidental earthy sulphates of the water used in vinegar-making. The non-precipitation of sulphate of barytes by the second addition of chloride of barium after filtration, shows that too much sulphuric acid has not been used by the maker, who is allowed by law to mix 1·1000th of this acid with the vinegar he makes. The non-action of hydrosulphuric acid demonstrates the absence of most metallic oxides.

Acidum Aceticum, *An Acid prepared from wood*
Acetic Acid. *by fire, purified.*

Free from colour, with a very pungent odour; specific gravity 1·048; by heat it goes off in vapour. Nothing is thrown down from it on the addition either of nitrate of silver, or chloride of barium. A strip of silver being digested in it, and hydrochloric acid afterwards dropped in, nothing is thrown down. Neither hydrosulphuric acid, nor ammonia, nor ferrocyanide of potassium after the addition of ammonia, alters its colour. One hundred grains of this acid are saturated by 87 grains of the crystals of carbonate of soda.

Remarks.—The total evaporation by heat shows that no solid impurity is dissolved in the acetic acid; the non-precipitation by nitrate of silver proves the absence of hydrochloric acid, and the non-action of chloride of barium shows that no sulphuric acid is present. If any nitric acid were present, it would dissolve a portion of the silver digested in the acetic acid, and hydrochloric acid would precipitate it in the state of chloride. The non-action of hydrosulphuric acid proves the absence of metallic admixture in general. The smallest portion of copper is detected by first saturating with ammonia, and the occurrence of a reddish brown tint, and eventually of a precipitate of the same colour, on the addition of ferrocyanide of potassium to the solution. The saturating power of this acid shows that it contains 30·8 per cent. of real acetic acid.

Acidum Arseniosum, *A metallic acid prepared by*
Arsenious Acid. *sublimation.*

White or slightly yellowish, usually opaque, but sometimes, also, when freshly broken, more or less translucent. Heated in a glass tube, it is sublimed of a white colour; afterwards, when it has cooled, it is converted into octohedral crystals free from colour. Mixed with charcoal and exposed to heat, it is reduced to arsenic, and it sublimes, exhaling an alliaceous odour; afterwards, when it has cooled, it adheres to the tube, shining like a metal*. It is dissolved by boiling water, from which, when it has cooled, it falls in octohedral crystals. This solution, when hydrosulphuric acid is added to it, throws down a yellow substance;

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* The alliaceous odour is due to the metallic arsenic, which condenses on the sides of the tube forming the metallic coating alluded to in the text.

ammonia, and afterwards, nitrate of silver being added, a lemon-coloured substance; and potash being added with sulphate of copper, a green substance. If 100 grains of this acid be boiled in dilute hydrochloric acid, and when the solution has cooled hydrosulphuric acid be mixed with it, 124 grains of tersulphuret of arsenic are precipitated.

Remarks.—See PREPARATIONS AND COMPOUNDS. *Liquor Arsenici Chloridi.*

Acidum Benzoicum, *Benzoic Acid.*	*An Acid procured from Benzoin by sublimation.* *The crystals.*

White or nearly so; when heat is cautiously applied, it volatilizes, exhaling a peculiar odour. Slightly soluble in water, copiously in rectified spirit. It is also dissolved by solutions of ammonia, potash, soda and lime, and is precipitated from them by hydrochloric acid.

Remarks.—See PREPARATIONS AND COMPOUNDS. *Tinctura Camphoræ composita.*

Acidum Citricum,	Citrus Limonum, and other species.
Citric Acid.	*An Acid procured from the juice of the fruit.* *The crystals.*

Free from colour, totally or almost totally dissipated in the fire. Soluble in water and in spirit. What is precipitated from the watery solution by acetate of lead, is dissolved by nitric acid. No salt prepared from potash, except the tartrate, precipitates anything with it. Sparingly added to cold lime-water it does not render it turbid. One hundred grains dissolved in water are saturated by 205·7 grains of the crystals of carbonate of soda.

Remarks.—See PREPARATIONS AND COMPOUNDS. *Liquor Ammoniæ Citratis.*

Acidum Gallicum, *Gallic Acid.*	*An Acid prepared from Galls.* *The crystals.*

Free from colour, destroyed in the fire. Soluble in water and in rectified spirit. To the preparations of sesquioxide of iron dissolved in water, it imparts a bluish-black colour; but it throws down nothing from a solution of isinglass.

Remarks.—See PREPARATIONS AND COMPOUNDS. *Tinctura Gallæ.*

Acidum Hydrochloricum, *An Acid prepared from*
Hydrochloric Acid. *Chloride of Sodium.*

Free from colour; its specific gravity is 1·16; exposed to the air, it emits white and extremely acrid vapours; by heat it is totally vaporized. When mixed with water, it precipitates nothing on the addition either of chloride of barium, ammonia, or the sesquicarbonate of ammonia. Upon strips of gold, even when they are boiled in it, it exerts no action; nor if protochloride of tin be afterwards added, does it precipitate anything. It does not remove the colour from solution of sulphate of indigo. One hundred grains of this acid are saturated by 132 grains of the crystals of carbonate of soda.

Remarks.—Its being colourless shows that the acid does not contain much chlorine or sesquichloride of iron. The total evaporation by heat proves that no fixed nor solid impurity is dissolved in it. The non-action of chloride of barium shows that no sulphuric acid is present, or sulphate of barytes would be precipitated. Ammonia, or the sesquicarbonate of ammonia, would detect the presence of most metals by precipitating, and in some cases by afterwards redissolving them, when added in excess. Gold, even when heated in hydrochloric acid, is not dissolved unless chlorine be present, and then it is taken up and may be precipitated of a dark colour by the protochloride of tin. If chlorine be present, it will also destroy the colour of the solution of indigo. When 100 grains of this acid saturate 132 grains of the crystals of carbonate of soda, it contains rather more than 33·9 grains of hydrochloric acid gas.

For additional Remarks, see PREPARATIONS AND COMPOUNDS. *Acidum Hydrochloricum dilutum.*

Acidum Nitricum, *An Acid prepared from Ni-*
Nitric Acid. *trate of Potash.*

Free from colour; specific gravity 1·42; exposed to the air it emits extremely acrid vapours; by heat it is totally vaporized. Diluted with three times its bulk of water, it precipitates nothing either from nitrate of silver or chloride of barium. One hundred grains of this acid are saturated by 161 grains of the crystals of carbonate of soda.

Remarks.—The total vaporization by heat proves that no fixed impurity is held in solution by the acid. Nitrate of silver gives a precipitate when chlorine or its compounds are present; chloride of barium precipitates sulphate of barytes from the diluted acid when sulphuric acid or a sulphate is present; 161 grains of carbonate of soda indicate rather more than 60 per cent. of real nitric acid.

For additional Remarks, see PREPARATIONS AND COMPOUNDS. *Acidum Nitricum dilutum.*

Acidum Sulphuricum,
Sulphuric Acid.

An Acid prepared from Sulphur.

Free from colour and smell; its specific gravity is 1·843. Mixed with an equal measure of water, it usually precipitates a small quantity of white matter; it emits no vapour of nitrous acid. Diluted with twelve parts of water, it precipitates nothing yellow on the admixture of hydrosulphuric acid. One hundred grains of this acid are saturated by 285 grains of the crystals of carbonate of soda.

Remarks.—Its being colourless shows that no carbonaceous matter has fallen into and been decomposed by the acid. The white precipitate occasioned by admixture with water is sulphate of lead. The non-production of a yellow or any other precipitate in the diluted acid, by the addition of hydrosulphuric acid, evinces the absence of arsenious acid and of metallic matter in general.

Additional Remarks.—See PREPARATIONS AND COMPOUNDS. *Acidum Sulphuricum dilutum.*

Acidum Tannicum,
Tannic Acid.

An Acid procured from Galls.

Nearly free from colour; dissolved in water it is strongly astringent; from a solution of isinglass it throws down a white precipitate. In other respects it agrees with what is above stated with respect to Gallic Acid.

Remarks.—See PREPARATIONS AND COMPOUNDS. *Tinctura Gallæ.*

Acidum Tartaricum,
Tartaric Acid.

An Acid prepared from Bitartrate of Potash.
The crystals.

Free from colour; totally or almost totally destroyed in the fire; soluble in water. This solution precipitates bitartrate of potash from any neutral salt of potash. Nothing is precipitated from the same solution by chloride of barium; whatever is precipitated by acetate of lead is dissolved by nitric acid. One hundred grains of this acid are saturated by 192 grains of the crystals of carbonate of soda.

Remarks.—It contains no earthy nor fixed impurity if totally destroyed by fire. When chloride of barium gives no precipitate, no sulphuric acid nor sulphate is present, and the same is proved by the solubility of the precipitate occasioned by acetate of lead; tartrate of lead being readily soluble, and sulphate of lead being nearly insoluble in dilute nitric acid.

For additional Remarks—See PREPARATIONS AND COMPOUNDS. *Ferri Potassio-tartras.*

Aconiti Folium, *Leaf of Aconite.*	Aconitum Napellus, *The fresh and dried Leaf.*

Smooth, five-parted, the segments wedge-shaped and pinnately cut.

Aconiti Radix, *Root of Aconite.*	*The Root.*
Adeps, *Hog's Lard.*	Sus Scrofa, *The prepared Lard.*

That which has been preserved with chloride of sodium, is not to be used.

Ærugo, *Verdigris.*	Cupri Diacetas, *Diacetate of Copper.*

Partly soluble in water, and almost totally so in dilute sulphuric acid with the assistance of heat; from this solution nothing is precipitated by ammonia added in excess.

Remarks.—Pure oxide of copper is entirely soluble in excess of ammonia; if therefore any precipitate be formed by its addition, it is owing to some impurity.

Æther, *Ether.* (*Æther Sulphuricus,* Ph. 1836.)	*Ether prepared from Alcohol, by means of Sulphuric Acid.*

Free from colour; specific gravity does not exceed 0·750; exposed to the air it evaporates; it stains litmus either not at all, or very slightly of a red colour. Half a pint of water is required to completely combine with a fluidounce of it.

Remarks.—If the specific gravity exceed 0·750, water or alcohol is present; if litmus paper be reddened, the presence of an acid is denoted; and if a fluidounce combine with less than half a pint of water, alcohol or water may be suspected.

Additional Remarks.—See PREPARATIONS AND COMPOUNDS. *Ætherea.*

Aloe Barbadensis, *Barbadoes Aloes.*	Aloe vulgaris, *The inspissated Juice of the divided Leaf.*

Opaque, dull, of a liver colour, afterwards becoming blackish, of a nauseous bitter taste, and a very unpleasant odour.

Aloe hepatica, *Hepatic Aloes.*	Aloes species incerta, *An uncertain species of Aloe.* *The inspissated Juice of the Leaf?*

Opaque, of a liver colour, bitter taste, and unpleasant odour.

Aloe Socotrina (*Aloe, Ph.* 1836), *Socotrine Aloes.*	Aloes species incerta, *An uncertain species of Aloe.* *The Juice of the divided Leaf indurated by the air.*

It is brittle, bitter, of a reddish brown colour, and aromatic odour; translucent when in thin fresh laminæ.

Althæa, *Marshmallow.*	Althæa officinalis, *The Root.*
Alumen, *Alum.*	Aluminæ et Potassæ, Sulphas *crystallina.* *Sulphate of Alumina and Potash. Crystalline.*

Remarks.—See PREPARATIONS AND COMPOUNDS. *Alumen Exsiccatum.*

Ammoniacum, *Ammoniacum.*	Dorema Ammoniacum, (DON), *The Gum-resin flowing from the stem and flower-stalk, indurated by the air.*

Either in lumps, or has the appearance of grains. That which is in lumps requires purification.

Ammoniæ Hydrochloras, *Hydrochlorate of Ammonia.*	*Hydrochlorate of Ammonia, Crystalline.*

Remarks.—See PREPARATIONS AND COMPOUNDS. *Liquor Ammoniæ Sesquicarbonatis.*

Ammoniæ Liquor,
Solution of Ammonia.

Free from colour; specific gravity 0·960; exposed to the air it escapes in very acrid alkaline evanescent vapours, as shown by turmeric. Lime-water being added, nothing is precipitated; hydrosulphuric acid being poured in, it is not coloured; nor, when it has been first saturated by nitric acid, does it precipitate anything on the addition either of sesquicarbonate of ammonia, nitrate of silver, or chloride of barium. Nearly ten grains of ammonia are contained in 100 grains of the solution.

Remarks.—Pure water should remain after the evaporation of the ammonia from this solution. If its specific gravity exceed 0·960, it is then too weak. When lime-water gives no precipitate, no carbonate of ammonia is present; the non-action of hydrosulphuric acid denotes the absence of metallic matter, generally. If after saturation with nitric acid, neither sesquicarbonate of ammonia, nitrate of silver, nor chloride of barium give any precipitate, the solution is free from earthy matter, chlorides, and sulphates.

For additional Remarks,—See *Liquor Ammoniæ Sesquicarbonatis.*

Ammoniæ Liquor fortior,
Stronger Solution of Ammonia.

Specific gravity of this is 0·882. This solution may be reduced to the strength of the weaker solution of ammonia by adding to every ounce of it two ounces of distilled water. Nearly 30 grains of ammonia are contained in 100 grains of the stronger solution.

Ammoniæ Sesquicarbonas, *Sesquicarbonate of Ammonia.*	Ammoniæ Sesquicarbonas, *crystallina.* *Sesquicarbonate of Ammonia, crystalline.*

Free from colour; translucent, has an acrid smell and taste; changes the colour of turmeric to brown; is dissipated by heat; soluble in water. Nitric acid being added to saturation, nothing is thrown down either by chloride of barium, or nitrate of silver.

Remarks.—If anything remain after the application of heat or the action of water, it is an impurity. The non-precipitation by nitrate of silver or chloride of barium, after saturation with nitric acid, proves the absence of hydrochloric acid and sulphuric acid.

For additional Remarks,—See *Liquor Ammoniæ Sesquicarbonatis.*

Amygdala (*Jordanica*), *Jordan Almond* (*Amygdala dulcis, Ph.* 1836).	Amygdalus communis, *var. dulcis.* *The Seed.*

Oblong, more than an inch in length, externally of a cinnamon colour, of a sweet agreeable taste.

Amygdalæ Oleum, *Oil of Almond.*	Amygdalus communis, *vars. amara et dulcis,* *The Oil expressed from the Seed.*
Amylum, *Starch.*	Triticum vulgare, (VILLARS), *The Fæcula of the Seed.*
Anethum, *Dill.*	Anethum graveolens, *The Fruit.*
Anethi Oleum, *Oil of Dill.*	*The Oil distilled from the Fruit.*
Anisum, *Anise.*	Pimpinella Anisum, *The Fruit.*
Anisi Oleum, *Oil of Anise.*	*The Oil distilled from the Fruit.*
Anthemis, *Chamomile.*	Anthemis nobilis, *The Flower.*
Anthemidis Oleum, (*Anglicum*). *Oil of Chamomile* (*English*).	*The Oil distilled from the Flower.*

Antimonii Tersulphuretum,
Tersulphuret of Antimony,
(*Antimonii Sesquisulphuretum, Ph.* 1836).

Striated, soluble in boiling hydrochloric acid.

Remarks.—See PREPARATIONS AND COMPOUNDS. *Antimonii Oxysulphuretum.*

Aqua destillata,
Distilled Water.

It remains clear whether there be added to it lime-water, chloride of barium, nitrate of silver, oxalate of ammonia, or hydrosulphuric acid.

Remarks.—The non-action of lime-water proves the absence of carbonic acid or carbonate of lime or of magnesia held in solution by it, for with them a white precipitate would be formed. If chloride of barium give no precipitate, no sulphuric acid nor sulphate is present; nitrate of silver precipitates chloride of silver, if any chloride exists in the water; oxalate of ammonia gives no precipitate when lime is absent, and most metals are detected by the action of hydrosulphuric acid.

Argenti Nitras, *Nitrate of Silver.*	Argenti Nitras *fusa,* *Nitrate of Silver, fused.*

White, soluble in water. This solution, copper being immersed in it, precipitates silver. If after 17 grains of nitrate of silver have been added to 6 grains of chloride of sodium dissolved in water, more of the nitrate be added to the filtered liquor, nothing further is precipitated. The access of light to this substance must be prevented.

Remarks.—If this substance be of a dark colour, it may be owing to the presence of oxide of copper derived from impure silver; to oxide of silver, owing to the heat employed in fusion being so strong as to decompose the nitrate of silver and form oxide; and lastly, to the action of light upon the nitrate when in contact with paper. If 6 grains of chloride of sodium require more than 17 grains of nitrate of silver for their decomposition, it is probably owing to the presence of saline matter, as nitrate of potash. If ammonia be added in excess to a solution of nitrate of silver no precipitate is formed, oxide of silver being entirely soluble in it; and if the ammoniacal solution have a blue colour it is owing to the presence of copper. Any portion of nitrate of silver insoluble in ammonia or distilled water is an impurity.

For additional Remarks see Appendix. *Argenti Nitras, Crystalli.*

Armoracia, *Horseradish.*	Cochlearia Armoracia, *The fresh Root.*
Assafœtida, *Assafœtida.*	Narthex (*Ferula*) Assafœtida, (Falconer), *The Gum-resin emitted from the sliced root.*
Atropia, *Atropia.*	Atropa Belladonna, *An alkali procured from the root. The crystals.*

White, has the form of a prism, soluble in water and in rectified spirit. No means have yet been discovered of indicating the purity of this substance with certainty.

Remarks.—See Preparations and Compounds. *Atropiæ Sulphas.*

Avena, *Oat.*	Avena sativa, *The Seed freed from husk.*
Aurantii Cortex, *Orange Peel.*	Citrus Bigaradia, (Risso), *The outer Rind of the Fruit.*

Dry this in the month of February, March or April.

Aurantii Floris Aqua,	Citrus Bigaradia, (Risso), and Citrus Aurantium, (De Candolle),
Orange Flower Water.	*Water distilled from the Flower.*

It is not coloured by hydrosulphuric acid.

Remarks.—This distilled water is stated to contain acetic acid derived from the flowers; hence, if kept in a metallic vessel, it has been found to act upon it. Hydrosulphuric acid will impart a dark colour to the water if it contain either copper or lead.

Balsamum Peruvianum,	Myrospermi (*Myroxili*) species incertæ,
Peruvian Balsam.	*Balsam flowing from the incised trunk.*

Balsamum Tolutanum,	Myrospermum toluiferum,
Tolu Balsam.	*Balsam flowing from the incised trunk, indurated.*

Belladonna,	Atropa Belladonna,
Deadly Nightshade.	*The Leaf fresh and dried.*

Oval, acute, quite entire, smooth, fœtid when bruised. The herb which grows spontaneously in hedges and uncultivated places is to be preferred to that cultivated in gardens.

Benzoinum,	Styrax Benzoin,
Benzoin.	*Balsam flowing from the incised bark, indurated by the air.*

Bismuthum,
Bismuth.

The specific gravity of this is 9·8.

Remarks.—See Preparations and Compounds. *Bismuthi Nitras.*

Borax,	Sodæ Biboras. *Crystalli.*
Borax.	*Biborate of Soda. The crystals.*

Soluble in boiling water. From this solution, when saturated and boiling, sulphuric acid precipitates colourless crystalline scales of boracic acid.

Buchu, (*Diosma, Ph.* 1836),	Barosma serratifolia, Willd., B. crenulata, Willd., et B. crenata, Eckl.
Buchu.	*The Leaf.*

Smooth, glandular, either linear-lanceolate and serrulated, or ovato-oblong, obtuse and crenated; or either ovate or obovate and serrated.

Cajuputi, *Cajuput.*	Melaleuca minor, *The Oil distilled from the Leaf.*
Calamina præparata, *Prepared Calamine.*	*Native* Carbonate of Zinc, *burnt, reduced to a very fine powder, and elutriated.*

Almost entirely soluble in diluted sulphuric acid, emitting no or very few bubbles of carbonic acid. This solution, when ammonia or potash is added to it, gives a precipitate which is dissolved by either of them added in excess.

Remarks.—If totally or nearly soluble in dilute sulphuric acid, the burnt calamine contains but little or no lime. The sulphuric solution should be colourless, and remain so after the addition of the excess of ammonia or potash; if blue after the ammonia, the calamine contains copper; and if it contain iron both ammonia and potash throw down the oxide, which neither of them redissolves when added in excess. Any residue insoluble in sulphuric acid is an impurity.

Calcii Chloridum, *Chloride of Calcium.*	
Calumba, *Calumba.*	Cocculus palmatus, *The Root.*
Calx, *Lime.*	Calx *e Cretá recens comparata,* Lime *recently procured from Chalk.*

Water being added it cracks and falls to powder. It is dissolved in diluted hydrochloric acid without effervescence. This solution, ammonia being added in excess, precipitates nothing.

Remarks.—If any portion do not slack on the addition of water, it may consist of earthy impurity or of chalk insufficiently burnt: if the latter, it will dissolve in dilute hydrochloric acid with effervescence. If ammonia give a precipitate when added to the solution in hydrochloric acid, it may be owing to oxide of iron, alumina, or a small portion of phosphate of lime.

Remarks.—See PREPARATIONS AND COMPOUNDS. *Liquor Calcis.*

Calx chlorinata,
Chlorinated Lime.

It is dissolved in dilute hydrochloric acid, emitting chlorine.

Remarks.—See PREPARATIONS AND COMPOUNDS. *Liquor Sodæ Chlorinatæ.*

Cambogia, *Gamboge.*	Garciniæ species incerta, *An uncertain species of Garcinia,* *The Gum-resin.*
Camphora, *Camphor.*	Camphora officinarum, (NEES). (*Laurus Camphora*), *A Concrete procured by sublimation from the Wood, and purified.*
Canella, *Canella.*	Canella alba, *The Bark.*
Cantharis, *Cantharis.*	Cantharis vesicatoria, (LATREILLE).
Capsicum (*Guineense*), *Capsicum* (*Guinea*).	Capsicum fastigiatum, (BLUME), *The Fruit.*

Less than an inch in length, oblongo-cylindrical, straight.

Carbo, (*Carbo Ligni, Ph.* 1836), *Charcoal.*	Charcoal *prepared from Wood by fire.*
Carbo Animalis, *Animal Charcoal.*	Charcoal *prepared from Bullock's Blood by fire.*
Cardamomum, *Cardamom.*	Elettaria (*Alpinia*, ROXB.) Cardamomum (MATON.), *The Seed.*
Carota (*Dauci Radix*, Ph. 1836), *Carrot.*	Daucus Carota, *var. sativa,* *The fresh Root.*
Carui, *Caraways.*	Carum Carui, *The Fruit.*
Carui Oleum, *Oil of Caraway.*	*The Oil distilled from the Fruit.*
Caryophyllum, *Clove.*	Caryophyllus aromaticus, *The unexpanded Flower.*
Caryophylli Oleum, *Oil of Clove.*	*The Oil distilled from the unexpanded Flower.*

Cascarilla, *Cascarilla.*	Croton Eleuteria, (Swartz), *The Bark.*
Cassia, *Cassia.*	Cassia Fistula, *The Fruit.*
Castoreum, *Castor.*	Castor Fiber, *The follicles of the prepuce filled with a peculiar secretion.*
Catechu, *Catechu.*	Acacia Catechu, *An Extract of the inner Wood.*

Compact, brittle, blackish colour, bitter taste and strongly astringent.

	vel Uncaria Gambir, *An extract of the Leaf.*

Prepared in the form of the cube, porous, of a reddish colour, a bitter taste, strongly astringent; almost entirely dissolved in boiling water. This solution when cold does not exhibit a blue colour with iodide of potassium and diluted nitric acid added together.

If to 100 grains of either variety ether be added, it ought to be so dissolved that 40 grains of the dried ethereal extract should dissolve in cold water.

Remarks.—The non-production of a blue colour by the simultaneous action of iodide of potassium and nitric acid shows that the Catechu is not adulterated with starch.

Cera, *Wax.*	Apis mellifica, *The prepared Honeycomb.*
Cera alba, *White Wax.*	*The same bleached.*
Cerevisiæ Fermentum, *Yest of Beer.*	
Cetaceum, *Spermaceti.*	Physeter macrocephalus, *A Concrete prepared from the oily matter of the head.*
Cetraria, *Liverwort.*	Cetraria Islandica, (Achar.).
Chimaphila, *Winter-green or Pyrola.*	Chimaphila umbellata, (*C. corymbosa*, Pursh.), *The Herb.*

Cinchona flava (*regia*), (*Cinchona cordifolia*, *Ph.* 1836),	Cinchona Calisaya, (WEDDELL),
Yellow Bark.	*The Bark.*

Thick, covered mostly with very slender sharp fibres, either flat or quilled; the outer surface either grey or brownish, wrinkled longitudinally, split transversely with deep cracks, or compassed round with them. It is frequently denuded and of a brownish cinnamon colour. Tastes extremely bitter. From a pound of this bark should be obtained, by means of sulphuric acid, about three drachms of disulphate of quina.

Remarks.—See PREPARATIONS AND COMPOUNDS. *Decoctum Cinchonæ.*

Cinchona pallida (*de Loxa*), (*Cinchona lancifolia*, *Ph.* 1836),	Cinchona Condaminea, (WEDDELL),
Pale Bark.	*The Bark.*

Thin, quilled; the outer surface brown, often covered with lichens, and split with many transverse cracks, occasionally encompassed with them; the inner surface of a cinnamon-brown colour; taste bitter and astringent.

Remarks.—See PREPARATIONS AND COMPOUNDS. *Decoctum Cinchonæ pallidæ.*

Cinchona rubra (*Cinchona oblongifolia*, *Ph.* 1836),	Cinchonæ species incerta, *An uncertain species of Cinchona*,
Red Bark.	*The Bark.*

Thick, either flat or quilled, externally rough with wrinkles, furrows, or warts, reddish-brown, or of a chestnut-brown colour; taste bitter.

Remarks.—See PREPARATIONS AND COMPOUNDS. *Decoctum Cinchonæ rubræ.*

Cinnamomum,	Cinnamomum Zeylanicum (NEES), (*Laurus Cinnamomum*),
Cinnamon.	*The Bark.*

Thin, much quilled; the smaller quills being enclosed within the larger.

Cinnamomi Oleum,	
Oil of Cinnamon.	*The Oil distilled from the Bark.*

Coccus, *Cochineal.*	Coccus Cacti.
Colchici Cormus, *Cormus of Meadow Saffron.*	Colchicum autumnale, *The fresh and dried Cormus of the wild herb.*

Let it be dug up in the month of July or before the autumnal bud has swelled.

The Drying.—The withered coats having been removed, cut the cormus into thin slices, and dry them at first with a gentle heat, afterwards gradually increased to the 150th degree.

Colchici Semen, *Seed of Meadow Saffron.*	*The Seed.*
Colocynthis, *Colocynth.*	Citrullus (*Cucumis*) Colocynthis, (SCHRAD.), *The peeled Fruit.*
Conium, *Hemlock.*	Conium maculatum, *The fresh and dried Leaf of the wild Herb.*
Copaiba, *Copaiva.*	Copaifera multijuga, (HAYNE), and other species, *An Oleo-Resin flowing from the incised trunk.*
Copaibæ Oleum, *Oil of Copaiva.*	*The Oil distilled from the Oleo-Resin.*
Coriandrum, *Coriander.*	Coriandrum sativum, *The Fruit.*
Cornu, *Horn.*	Cervus Elaphus, *The Horn.*
Cornu ustum, *Burnt Horn.*	Phosphate of Lime *procured from Horn by fire.*
Creasotum, *Creasote.*	*An Oxy-hydrocarburet prepared from Pyroxylic Oil.*

Free from colour; peculiar odour; soluble in acetic acid. Its specific gravity is 1·046. When dropped on bibulous paper, and a boiling heat is applied for a short time, it escapes, without leaving a transparent spot.

Creta præparata, *Prepared Chalk.*	*A friable* Carbonate of Lime, *reduced to very fine powder, and elutriated.*

Almost entirely soluble in diluted hydrochloric acid, emitting small bubbles of carbonic acid. The solution does not precipitate anything on the addition of hydrosulphuric acid, nor after it has been boiled, with ammonia or lime-water added in excess.

Crocus, *Saffron.*	Crocus sativus, *The Stigma.*

Consists of thrice-divided threads of an orange-red colour; the segments dilated at the top. Moistened with water and bruised on white paper, it stains it readily of an orange colour.

Cubeba, (*Piper Cubeba, Ph.* 1836), *Cubebs.*	Piper Cubeba, *The unripe Fruit.*

The fruit with the footstalk.

Cupri Sulphas venalis, *Commercial Sulphate of Copper.*	Cupri Sulphas *impura,* *Impure* Sulphate of Copper, *The crystals.*
Cusparia, *Cusparia or Angustura Bark.*	Galipea Cusparia ?, *The Bark.*
Cydonium, *Quince.*	Cydonia vulgaris, *The Seed.*
Cyminum, *Cummin.*	Cuminum Cyminum, *The Fruit.*
Digitalis, *Foxglove.*	Digitalis purpurea, *The fresh and dried Stem-leaf of the wild Herb.*

Subsessile or shortly petiolated, ovato-lanceolate or oblong; narrowed at the base; crenated; wrinkled and veined; the under or both sides woolly.

Let it be gathered before the terminal flowers are unfolded.

The Drying.—The petiole and mid-rib being removed, dry the lamina.

Dulcamara, *Woody Nightshade.*	Solanum Dulcamara, *The young Shoot.*

It is to be collected in autumn, and free from leaves.

Elaterium, *Wild Cucumber.*	Ecbalium officinarum, (Richard), (*Momordica Elaterium*), *The fresh Fruit not quite ripe.*
Elemi, *Elemi.*	Planta incerta. *An unknown Plant.* *A concrete Turpentine.*
Ergota, *Ergot.*	Secale cereale, *The Seed diseased by a parasitic Fungus?*
Farina, *Flour.*	Triticum vulgare, (Villars), *The Flour of the Seed.*
Ferri Sulphas venalis, *Commercial Sulphate of Iron.*	Ferri Sulphas *impura,* *Impure* Sulphate of Iron, *The crystals.*
Ferrum in fila tractum, *Iron drawn into Wire.*	

Flexible but not resilient.

Ficus, *Fig.*	Ficus Carica, *The prepared Fruit.*
Fœniculum, *Fennel.*	Fœniculum dulce, *The Fruit.*
Fœniculi Oleum, *Oil of Fennel.*	*The Oil distilled from the Fruit.*
Galbanum, *Galbanum.*	Galbanum officinale, (Don), *The Gum-resin.*
Galla, *The Gall-nut.*	Quercus infectoria, *A swelling of the small branches, caused by the Cynips Gallæ tinctoriæ.*

Bluish black, heavy, not perforated.

Gentiana, *Gentian.*	Gentiana lutea, *The Root.*
Glycyrrhiza, *Liquorice.*	Glycyrrhiza glabra, *The fresh and dried Root.*

Keep the fresh root laid up in dry sand for use.

Granati Radix, *Pomegranate Root.*	Punica Granatum, *The Bark of the Root.*
Granatum, *Pomegranate.*	*The Rind of the Fruit.*
Guaiaci Lignum, *Guaiacum Wood.*	Guaiacum officinale, *The Wood.*
Guaiacum (*Guaiaci Resina, Ph.*1836), *Guaiacum.*	*The Resin procured from the Wood by means of fire.*
Hæmatoxylum, *Logwood.*	Hæmatoxylon Campechianum, *The Wood.*
Helleborus, *Hellebore.*	Helleborus niger, *The Rootstock and Root.*
Hirudo, *The Leech.*	Sanguisuga (*Hirudo*, CUV.) medicinalis (SAVIGNY), and S. officinalis (SAV.).
Hordeum, *Barley.*	Hordeum distichon, *The Seed freed from the Husk.*
Hydrargyrum, *Quicksilver* (*Mercury*).	Hydrargyrum *colatum*, *Strained Quicksilver.*

Its specific gravity is 13·5. Goes off in vapours by heat. When globules are slowly rolled about on a sheet of paper, not the smallest portion adheres to the paper.

Hyoscyamus, *Henbane.*	Hyoscyamus niger, *The Stem-leaf fresh and dried, of the second year's herb.*

Sessile, oblong, acutely sinuous, subpubescent, with viscid fœtid hairs.

Let it be gathered and dried as we have directed for Foxglove. The herb, which grows in deposits of rubbish, and in highways spontaneously, is to be preferred to that which is cultivated in gardens.

Jalapa, *Jalap.*	Exogonium Purga, (Benth.), *The Tuber.*
Inula, *Elecampane.*	Inula Helenium, *The Root.*
Iodinium, *Iodine.*	Iodine, *crystalline.*

Black, metallic lustre, odour resembles that of chlorine. Heat being applied to it, it first liquifies, then sublimes in a violet vapour. It is dissolved in rectified spirit. This solution stains starch of a blue colour. Thirty-nine grains of iodine, dissolved in three ounces of water with nine grains of lime, by a gentle heat, stain the solution of a yellow or brownish colour.

Remarks.—See Preparations and Compounds. *Hydrargyri Iodidum.*

Ipecacuanha, *Ipecacuanha.*	Cephaelis Ipecacuanha, *The Root.*

Ash-coloured; crooked; very much cleft with deep cracks, and ring-marked; taste acrid, aromatic, bitterish.

Juniperus, *Juniper.*	Juniperus communis, *The Fruit.*
Juniperi Oleum (*Anglicum*), *Oil of Juniper* (*English*).	*The Oil distilled from the Fruit.*
Kino (Indicum), *Kino* (*Indian*).	Pterocarpus Marsupium, *The Juice flowing from the incised Bark, hardened in the sun.*
Krameria, *Rhatany.*	Krameria triandra, *The Root.*
Lactuca, *Lettuce.*	Lactuca sativa, *The Herb in flower.*

Lavandulæ Oleum (*Anglicum*), *Oil of Lavender* (*English*).	Lavandula vera, (*L. Spica, var. a*, LINN.), *The Oil distilled from the Flower.*
Laurus, *Bay.*	Laurus nobilis, *The Fruit.*
Limonum Cortex, *Lemon Peel.*	Citrus Limonum, *The fresh and dried outer Rind of the Fruit.*

Dry this in the month of April or May.

Limonum Oleum, *Oil of Lemons.*	*The volatile Oil expressed from the rind of the Fruit.*
Limonum Succus, *Juice of Lemons.*	*The Juice of the Fruit.*
Lini Oleum, *Oil of Linseed.*	Linum usitatissimum, *The Oil expressed from the Seed.*
Lini Semen, *Linseed.*	*The Seed.*
Lobelia, *Indian Tobacco.*	Lobelia inflata, *The Herb in flower.*
Lupulus, *Hop.*	Humulus Lupulus, *The Catkin.*
Magnesiæ Sulphas, *Sulphate of Magnesia.*	Magnesiæ Sulphas, *The crystals.*

Does not deliquesce in the air; soluble in water. Sulphuric acid dropped into this solution, no hydrochloric acid is emitted.

Remarks.—See PREPARATIONS AND COMPOUNDS. *Magnesiæ Carbonas.*

Manganesii Binoxidum, *Binoxide of Manganese.*	

Soluble in hydrochloric acid, evolving chlorine.

Manna, *Manna.*	Fraxinus rotundifolia; et F. Ornus?, *The Juice flowing from the incised Bark, hardened by the air.*

Maranta, *Arrow-root.*	Maranta arundinacea, *The Fæcula of the Tuber.*
Mastiche, *Mastich.*	Pistachia Lentiscus, *var.* *Chia,* *A resin flowing from the incised Bark.*
Mel, *Honey.*	Apis mellifica, *The Juice of Flowers deposited in the honeycomb, purified.*

If when dissolved in water at about 170 degrees, and after it has cooled, it be mixed with iodide of potassium and dilute nitric acid, it exhibits no blue colour.

Remarks.—See CATECHU, p. 18.

Mentha piperita, *Peppermint.*	Mentha piperita, *The Herb in flower, fresh and dried.*
Menthæ piperitæ Oleum, *Oil of Peppermint.*	*The Oil distilled from the Herb in flower.*
Mentha viridis, *Spearmint.*	Mentha viridis, *The Herb in flower, fresh and dried.*
Menthæ viridis Oleum, *Oil of Spearmint.*	*The Oil distilled from the Herb in flower.*
Mezereum, *Mezereon.*	Daphne Mezereum, *The Bark of the Root.*
Mori Succus, *Juice of Mulberries.*	Morus nigra, *The Juice of the Fruit.*
Morphiæ Acetas, *Acetate of Morphia.*	*A Salt prepared from Opium. The crystals.*

Soluble in water and in rectified spirit; when the spirit is distilled, the solution yields crystals, which are destroyed by fire. Nitric acid being added, the salt becomes first red, and then yellow. Tincture of sesquichloride of iron imparts a blue colour. Recently prepared chlorine being first added, and then ammonia, a brown colour is produced, which on the addition of more chlorine disappears. Morphia is precipitated by solution of potash, which if added in excess re-dissolves the precipitate.

Remarks.— See PREPARATIONS AND COMPOUNDS. *Extractum Opii.*

Morphiæ Hydrochloras, *Hydrochlorate of Morphia.*	*A Salt prepared from Opium.* *The crystals.*

Soluble in rectified spirit and in water. What is precipitated from the water by nitrate of silver, is not entirely dissolved either by ammonia, unless added in excess, nor by hydrochloric, nor nitric acid. It agrees in other respects with what is above stated of acetate of morphia.

Morrhuæ Oleum, *Oil of Cod.*	Gadus Morrhua, *The Oil procured from the Liver.*
Moschus, *Musk.*	Moschus moschiferus, *A Concrete found in the follicle of the prepuce.*
Mucuna, *Cowhage.*	Mucuna pruriens, *The Hairs of the Fruit.*
Myristica, *Nutmeg.*	Myristica officinalis, (*M. Moschata*, THUNB.), *The Seed stripped of the Shell.*
Myristicæ Oleum, *Oil of Nutmeg.*	*The Concrete Oil expressed from the Seed.*
Myrrha, *Myrrh.*	Balsamodendron Myrrha, (NEES), *The Gum-resin exuded from the Bark.*
Nux vomica, *Nux vomica.*	Strychnos Nux-vomica, *The Seed.*
Olivæ Oleum, *Olive Oil.*	Olea Europæa, *The Oil expressed from the Fruit.*

Opium (*Turcicum*), *Opium* (*Turkey*).	Papaver somniferum, *The Juice emitted from the incised unripe Fruit, indurated by exposure to the air.*
Ovi Albumen, *White of Egg.*	Gallus Bankiva, *var. domesticus*, (TEMMINCK), *The white of Egg.*
Ovi Vitellus, *Yelk of Egg.*	*The Yelk of Egg.*
Panis, *Bread.*	Panis *triticea*, *Wheaten Bread.*
Papaver, *Poppy.*	Papaver somniferum, *The ripe Fruit.*
Pareira, *Pareira.*	Cissampelos Pareira, *The Root.*
Petroleum, *Petroleum.*	*A blackish liquid Bitumen spontaneously exuding from the earth.*
Phosphorus, *Phosphorus.*	

Nearly free from colour; resembles wax; transparent; emits light in the dark. It ought to be kept in water, and excluded from access of light.

Pimenta, *Pimenta.*	Eugenia (*Myrtus*) Pimenta, *The unripe Fruit.*
Pimentæ Oleum, *Oil of Pimenta.*	*The Oil distilled from the Fruit.*
Piper longum, *Long Pepper.*	Piper longum, *The unripe Fruit.*
Piper nigrum, *Black Pepper.*	Piper nigrum, *The unripe Fruit.*
Pix (*Pix nigra, Ph.* 1836), *Pitch.*	*A dry Bitumen prepared from Tar.*

Pix Burgundica,	Abies excelsa,
Burgundy Pitch.	*An impure resin prepared from Turpentine.*
Pix liquida,	Pinus sylvestris, and other species,
Tar.	*A liquid Bitumen prepared from Wood by fire.*
Plumbi Acetas,	Plumbi Acetas,
Acetate of Lead.	*The crystals.*

Soluble in water. What is precipitated from the solution by carbonate of soda is white, that by iodide of potassium is yellow. Moreover hydrosulphuric acid being added, it turns black. Sulphuric acid, added to it, evolves acetic vapours. From 100 grains dissolved in water, sulphate of soda being added, there are precipitated 80 grains of sulphate of lead.

Remarks.—See PREPARATIONS AND COMPOUNDS. *Liquor Plumbi Diacetatis.*

Plumbi Oxidum,	Plumbi Oxidum (*semivitreum*).
Oxide of Lead.	

Entirely, or almost entirely soluble in diluted nitric acid. The solution turns black on adding hydrosulphuric acid. What is precipitated from it by potash is white, and by the same added in excess, it is again dissolved. From 100 grains of this oxide dissolved in diluted nitric acid, sulphate of soda being added, there are precipitated 135 grains of sulphate of lead.

Potassæ Bicarbonas,	Potassæ Bicarbonas,
Bicarbonate of Potash.	*The crystals.*

Soluble in water. This solution changes the colour of turmeric slightly to brown. Nothing is precipitated from it by sulphate of magnesia, unless heat is applied; nitric acid evolves small bubbles; and when the same acid is first added in excess, chloride of barium precipitates nothing, and nitrate of silver very little. From 100 grains there are expelled by a red heat 30·7 grains of water and carbonic acid.

Remarks.—Soluble in cold water and partially decomposed by hot water, with the evolution of carbonic acid gas. When imperfectly converted into bicarbonate, the action of the solution upon turmeric paper is stronger; it may however contain some carbonate of potash without precipitating carbonate of magnesia from the sulphate. When converted into nitrate of potash by excess of nitric acid, the non-precipitation by carbonate of soda denotes the absence of admixture with earthy matter in general; the non-effect of chloride of barium, under the same circumstances, indicates the absence of sulphate of potash; and the slight precipitation by nitrate of silver, when any occurs, shows that but little chloride of potassium, or chlorine in any state of combination, is present.

Potassæ Bitartras, *Bitartrate of Potash.*	Potassæ Bitartras, *Crystalline.*

Sparingly soluble in water. This solution stains litmus of a red colour. By a red heat it is converted into carbonate of potash.

Remarks.—See Preparations and Compounds, *Ferri Potassio-tartras.*

Potassæ Carbonas,
Carbonate of Potash.

Deliquesces in the air; almost entirely soluble in water. This solution changes the colour of turmeric to brown. When supersaturated with nitric acid, neither carbonate of soda, nor chloride of barium precipitates anything, and nitrate of silver very little, if any. One hundred grains of this salt lose 16 grains of water in a strong heat; and the same quantity, added to dilute sulphuric acid, evolves 26·3 grains of carbonic acid. Let it be kept in a well-stopped vessel.

Remarks.—See Preparations and Compounds. *Liquor Potassæ Carbonatis.*

Potassæ Chloras, *Chlorate of Potash.*	Potassæ Chloras, *The crystals.*

Soluble in water. The solution precipitates nothing when nitrate of silver is added to it. By heat it liquifies, and at a red heat, 100 grains yield nearly 39 grains of oxygen gas. A very few minims of sulphuric acid dropped on the crystals, the salt first becomes yellow, afterwards red, and exhales yellow vapours of peroxide of chlorine. Rubbed with sulphur it detonates.

Remarks.—If any chloride of potassium be present, then nitrate of silver, instead of yielding no precipitate, gives a white one of chloride of silver, insoluble in nitric acid. When it loses oxygen by heat the residual salt is chloride of potassium, amounting to nearly 61 per cent. of the chlorate heated. When rubbed with phosphorus both detonation and combustion occur.

Potassæ Nitras, *Nitrate of Potash.*	Potassæ Nitras, *The crystals.*

Soluble in water. From the solution nothing is precipitated either by chloride of barium or nitrate of silver. Liquifies by heat, but loses no weight: at a strong heat it emits oxygen. From the residual salt, rubbed to powder, sulphuric acid evolves nitrous vapours. Thrown on burning charcoal it deflagrates, carbonate of potash being left. From 100 grains digested in sulphuric acid are obtained 86 grains of sulphate of potash, dried at a red heat.

Remarks.—If chloride of barium or nitrate of silver yield no precipitate, neither a sulphate nor a chloride is present.

Potassæ Sulphas, *Sulphate of Potash.*	Potassæ Sulphas, *The crystals.*

Slightly soluble in water. What is precipitated from this solution by bichloride of platinum, is yellowish; that by chloride of barium, white, and insoluble in nitric acid. It decrepitates by heat; liquifies at a red heat, but loses no weight. From 100 grains, dissolved in distilled water, chloride of barium and hydrochloric acid being added, 132 grains of sulphate of barytes are obtained, dried at a red heat.

Potassæ Tartras, *Tartrate of Potash.*	Potassæ Tartras.

Soluble in water. The solution does not change the colour either of litmus or of turmeric; almost any acid being added, it precipitates crystals of bitartrate of potash, which for the most part adhere to the vessel. What is precipitated from the same solution, either by chloride of barium or acetate of lead, is dissolved in diluted nitric acid.

Remarks.—If the aqueous solution of this salt reddens litmus paper, the excess of acid of the bitartrate cannot have been saturated by the addition of carbonate of potash; if, on the other hand, turmeric paper is turned brown by the solution, excess of carbonate of potash has been added, which produces the alkaline reaction. Any precipitate occasioned either by chloride of barium or acetate of lead, which is insoluble in nitric acid, is either sulphate of barytes or of lead, either of them denoting the presence of a sulphate. If nitrate of silver should occasion a precipitate insoluble in nitric acid, it is owing to the presence of chloride of potassium or some other chloride.

Potassii Ferrocyanidum, Potassii Ferrocyanidum,
Ferrocyanide of Potassium. *The crystals.*

Yellow; soluble in water. The solution is not changed on the addition of any alkali or of tincture of galls. What is precipitated from it by sulphate of iron is white at first, afterwards it becomes blue; what is precipitated by sulphate of copper is brown; that by sulphate of zinc is white. By a gentle heat it loses colour, and from 100 grains 12·6 grains of water separate. At a red heat it is changed. What remains is soluble in hydrochloric acid, and ammonia being added, it is again thrown down. From 100 grains, 18·7 grains of sesquioxide of iron are obtained. Lastly, if the salt be boiled with diluted sulphuric acid, it exhales the odour of hydrocyanic acid.

Remarks.—Sulphate of iron is rarely so entirely free from sesquioxide as to give a white precipitate with ferrocyanide of potassium; the blue substance which it eventually becomes by exposure to the air is the well-known pigment prussian blue, called also ferrocyanide of iron. What remains after a red heat consists of carbonate of potash and sesquioxide of iron; the former is soluble in water, and the latter in hydrochloric acid, yielding sesquioxide of iron on the addition of ammonia.

Potassii Iodidum, Potassii Iodidum,
Iodide of Potassium. *The crystals.*

Soluble in six or eight parts of rectified spirit, very soluble in water. This aqueous solution does not at all, or only in a very slight manner change the colour of turmeric to brown; it does not alter the colour of litmus; nitric acid and starch being added together, it becomes blue; tartaric acid and starch being added, it is not coloured. What is precipitated from the same solution by acetate of lead is yellow, and is soluble in boiling water; but nothing precipitates on the addition of lime-water or chloride of barium. Moreover, if that which is precipitated by nitrate of silver be digested in the stronger solution of ammonia, and nitric acid then added to the filtered liquor, nothing is precipitated from it. From 100 grains dissolved in water, by the addition of nitrate of silver 141 grains of iodide of silver are precipitated.

Remarks.—If the colour of turmeric be changed to brown by iodide of potassium, the presence of potash or its carbonate is indicated; if litmus be altered, an acid is to be suspected. If lime-water give a precipitate, it is carbonate of lime, denoting the presence of carbonate of potash; and if chloride of barium render the solution turbid, it may be owing to the formation of carbonate or sulphate of barytes, or of both of them; the former dissolves in hydrochloric acid with effervescence, while the latter remains insoluble in it. If the precipitate of iodide of silver contain any chloride, it will be dissolved by the ammonia, and precipitated from it by supersaturation with nitric acid; but iodide of silver is insoluble in ammonia. If more than 141 grains of precipitate are yielded by 100 of iodide with the nitrate of silver, it is probably owing to the presence of chloride of potassium. It should lose no weight by being heated to 212°, and very little if heated much above that temperature, unless in an open vessel.

Potassii Sulphuretum,
Sulphuret of Potassium.

Remarks.—When fresh broken it has a brownish-yellow colour. If dissolved in water or in acids, it evolves the odour of hydrosulphuric acid. The aqueous solution is of a yellow colour. It throws down a red precipitate from acetate of lead, which soon becomes black. By exposure to the air, or by long keeping in imperfectly stopped vessels, it absorbs oxygen, and being converted into sulphate of potash becomes nearly colourless, sparingly soluble in water, emits no smell of hydrosulphuric acid, and gives a white precipitate of sulphate of lead when added to the acetate of that metal.

Prunum, *Prune.*	Prunus domestica, *The prepared Fruit.*
Pterocarpus, *Red Saunders.*	Pterocarpus santalinus, *The Wood.*
Pulegium, (*Mentha Pulegium, Ph.* 1836), *Pennyroyal.*	Mentha Pulegium, *The Herb in flower, fresh and dried.*
Pulegii Oleum, (*Menthæ Pulegii Oleum, Ph.* 1836), *Oil of Pennyroyal.*	*The Oil distilled from the Herb in flower.*

Pyrethrum, *Pellitory of Spain.*	Anacyclus (*Anthemis*) Pyrethrum, *The Root.*
Quassia, *Quassia.*	Picræna (*Quassia*) excelsa, (Lindl.) *The Wood.*
Quercus, *Oak.*	Quercus pedunculata, (Willd.) *The Bark.*
Quinæ Disulphas, *Disulphate of Quina.*	*A Salt prepared from yellow Bark,* *The crystals.*

It is dissolved in water, especially when mixed with an acid. Ammonia being added to the solution, quina is precipitated; the liquor being evaporated, should not taste of sugar. From 100 grains of disulphate of quina, 8 to 10 grains of water are expelled by a gentle heat. It is destroyed by heat. Recently prepared chlorine being first added to it, and afterwards ammonia, it becomes green. From 100 grains dissolved in water mixed with hydrochloric acid, 26·6 grains of sulphate of barytes, dried at a red heat, are obtained.

Remarks.—Sugar, mannite, and sugar of milk have been used for the adulteration of this salt. Any residue after exposure to a red heat and air is an impurity. Care must be taken to observe the order of mixing named in using chlorine and ammonia to produce the green colour. If more than 26·6 grains of sulphate of barytes are yielded by 100 grains, some sulphate has been used for adulteration. Sulphate of lime is stated to have been so employed; this would leave an incombustible residue.

Additional Remarks.—See Preparations and Compounds. *Decoctum Cinchonæ.*

Resina, *Resin.*	*What remains after the Oil is distilled from Turpentine.*
Rhamni Succus, *Juice of Buckthorn.*	Rhamnus catharticus, *The Juice of the Fruit.*
Rheum (*Sinense*), *Rhubarb* (Chinese).	Rhei species incerta, *An unknown species of Rhubarb,* *The Root.*

Rhœas, *Red Poppy.*	Papaver Rhœas, *The fresh Petal.*
Ricini Oleum, *Castor Oil.*	Ricinus communis, *The Oil procured from the seed by heat or pressure.*
Rosa canina, *Dog Rose.*	Rosa canina, *The fresh Fruit.*
Rosa centifolia, *Damask Rose.*	Rosa centifolia, *The fresh Petal.*
Rosa Gallica, *Red Rose.*	Rosa Gallica, *The unfolded Petal, fresh and dry.*
Rosmarini Oleum (*Anglicum*), *Oil of Rosemary* (*English*).	Rosmarinus officinalis, *The Oil distilled from the top in flower.*
Ruta, *Rue.*	Ruta graveolens, *The Leaf.*
Rutæ Oleum, *Oil of Rue.*	*The Oil distilled from the Herb in flower.*
Sabina, *Savine.*	Juniperus Sabina, *The Top, fresh and dried.*
Sabinæ Oleum, *Oil of Savine.*	*The Oil distilled from the top.*
Saccharum, *Sugar.*	Saccharum officinarum, *The Juice of the Stem prepared, purified and crystallized.*
Sacchari Fæx, *Treacle.*	*The prepared impure Juice.*
Sagapenum, *Sagapenum.*	Planta incerta, *An unknown Plant,* *The Gum-resin.*
Sago, *Sago.*	Sagus lævis, (RUMPH.), and perhaps other species of Palms, *The fæcula of the stem.*

Sambucus, *Elder.*	Sambucus nigra, *The fresh Flower.*
Sapo, *Soap.*	Soap, *made from Olive Oil and Soda.*
Sapo mollis, *Soft Soap.*	Soap, *made from Olive Oil and Potash.*

Common soft soap made of fish-oil, tallow and potash, should by no means be used instead of this.

Sarsa (*Jamaicensis*), *Sarsaparilla* (*Jamaica*).	Smilax officinalis, (Kunth?) *The Root.*

Reddish; most abundantly covered with rootlets; the bark not mealy.

Sassafras, *Sassafras.*	Sassafras officinale, (Nees), (*Laurus Sassafras*), *The Root.*
Scammonium, *Scammony.*	Convolvulus Scammonia, *The Gum-resin exuding from the cut root.*

Porous, brittle, shines on the fractured surface; hydrochloric acid being dropped upon it, it emits no bubbles; nor is water heated to 170°, in which, after bruising, it has been digested, tinged of a blue colour when iodide of potassium together with diluted nitric acid are added to it. Of 100 grains 78 should be soluble in ether.

Scilla, *Squill.*	Urginea Scilla (Steinheil), (*Scilla maritima*), *The fresh Bulb.*

The Drying.—Dry this in the same manner as directed for Meadow Saffron.

Scoparius, *Broom.*	Cytisus scoparius, *The Top, fresh and dried.*
Senega, *Senega.*	Polygala Senega, *The Root.*
Senna Alexandrina, *Alexandrian Senna.*	Cassia officinalis? (*Senna officinalis*, Roxb.) et C. obovata, *The Leaf.*

Unequal at the base, or ovate acute, or obovate mucronate.

Senna Indica, *Indian Senna.*	Cassia officinalis. (*Senna offinalis*, ROXB.), *The Leaf.*

Unequal at the base, lanceolate.

Serpentaria, *Serpentary.*	Aristolochia Serpentaria, *The Root.*
Sevum, *Suet.*	Ovis Aries, *The prepared Suet.*
Silex contritus, *Powdered Flint.*	
Sinapis, *Mustard.*	Sinapis nigra et S. alba, *Black and White Mustard,* *The Seed.*
Sodæ Bicarbonas, (*Sodæ Sesquicarbonas,* *Ph.* 1836), *Bicarbonate of Soda.*	

It is dissolved in water; it changes the colour of turmeric slightly brown. From this solution neither bichloride of platinum, nor sulphate of magnesia, unless heat be applied, precipitates anything; what chloride of barium precipitates is dissolved by hydrochloric acid. One hundred grains of this salt, added to diluted sulphuric acid, evolve 51·7 grains of carbonic acid.

Remarks.—Any portion of this preparation insoluble in water is an impurity; it is partially decomposed by boiling water, with the evolution of carbonic acid gas. If it turn turmeric paper strongly brown, it is deficient in carbonic acid; it may contain some carbonate of soda without precipitating carbonate of magnesia from the sulphate. The non-precipitation of the platinum salt shows that it contains no potash salt; what chloride of barium precipitates is carbonate of barytes, which is soluble in hydrochloric acid, and any insoluble portion is sulphate of barytes, derived from the decomposition of a sulphate. When saturated with nitric acid, nitrate of silver should not give any or but little precipitate of chloride of silver. It is insoluble in spirit.

Sodæ Carbonas, *Carbonate of Soda.*	Sodæ Carbonas, *The crystals.*

Free from colour, transparent, exposed to the air it soon falls to powder. It is dissolved in water. The solution changes the colour of turmeric brown. When saturated by hydrochloric acid, chloride of barium precipitates nothing from it. One hundred grains lose 62·5 grains of water at a strong heat. An equal quantity added to diluted sulphuric acid loses 15·28 grains of carbonic acid.

Remarks.—This salt quickly loses its form, transparency, and colour, by exposure to the air, but even at a red heat it parts with no carbonic acid. The solution turns turmeric paper strongly brown, as an alkali does. If chloride of barium give no precipitate after saturation with hydrochloric acid, no sulphate is present. If saturated with nitric acid, nitrate of silver should not give any precipitate of chloride of silver, or but very little. It is insoluble in spirit.

Sodæ Phosphas, *Phosphate of Soda.*	Sodæ Phosphas, *The crystals.*

Effloresces slightly on exposure to the air. It is dissolved in water. The solution changes the colour of turmeric slightly brown. What is precipitated from it by chloride of barium is white, and is dissolved in nitric acid without effervescence; the precipitate yielded by nitrate of silver is yellow, and is soluble in the same acid. At a red heat 100 grains lose 62·3 grains of water. What is precipitated from the remaining salt dissolved in water by nitrate of silver, is white.

Remarks.—This salt is insoluble in spirit. If the precipitate formed by chloride of barium is not totally soluble in nitric acid, it is owing to the presence of sulphate of barytes, and consequently of a sulphate in the phosphate. Should the precipitate formed by nitrate of silver be not totally soluble in nitric acid, it is owing to the presence of a chloride, the insoluble matter being chloride of silver. According to the degree of efflorescence the loss of water by heat will be proportionally less than above indicated. The white precipitate occasioned by nitrate of silver, after the phosphate has been heated, is pyrophosphate of silver.

Sodæ Potassio-tartras, *Potassio-tartrate of Soda.*	Sodæ Potassio-tartras, *The crystals.*

It is dissolved in water. The solution changes the colour neither of turmeric nor litmus. Sulphuric acid being added, bitartrate of potash is precipitated; when either nitrate of silver or chloride of barium is added, nothing is precipitated, or what is, may again be dissolved by the addition of water.

Sodæ Sulphas, *Sulphate of Soda.*	Sodæ Sulphas, *The crystals.*

Exposed to the air it falls to powder. It is dissolved in water.

The solution changes the colour neither of litmus nor turmeric. From a dilute solution, nitrate of silver precipitates scarcely anything. At a strong heat 100 grains lose 55·5 grains of water. Moreover, from 100 grains dissolved in distilled water, on the addition of chloride of barium and hydrochloric acid, there are obtained 71 grains of sulphate of barytes dried at a strong heat.

Remarks.—This salt is insoluble in spirit. If the solution redden litmus paper, then an acid is present; and if turmeric, then an alkali or an alkaline salt. If a precipitate insoluble in nitric acid be formed by nitrate of silver, the presence of a chloride is denoted. If at a red heat the loss exceeds 55·5 per cent., the salt must have been damp, and if less than this quantity, effloresced. The obtaining of less than 71 grains of sulphate of barytes would indicate moisture, and more than 71 grains, efflorescence.

Sodii Chloridum,	Sodii Chloridum,
Chloride of Sodium.	*The crystals.*

Remarks.—Almost equally soluble in cold or hot water. Does not alter the colour of litmus or turmeric, showing that no acid nor alkali is present. Restores the blue colour of litmus reddened by bichloride of mercury. Carbonate of soda gives in general a small precipitate of carbonate of magnesia, and nitrate of barytes gives slight indications of a sulphate, the sulphate of magnesia.

Spiritus rectificatus,	Alcohol *dilutum*,
Rectified Spirit.	*Diluted* Alcohol.

Specific gravity of this is 0·838. Free from colour, is not rendered turbid by the admixture of water, nor tinged red by the addition of sulphuric acid. This spirit may be reduced to the standard of the weaker spirit (proof spirit), by adding to every five pints of it, three pints of distilled water at a temperature of 62°.

Spiritus tenuior,	Alcohol *more diluted.*
Proof Spirit.	

The specific gravity of this is 0·920.

Spiritus Vini Gallici,	*Spiritus e Vino Gallico destillatus,*
Spirit of French wine, (*Brandy.*)	*Spirit distilled from French Wine.*
Staphisagria,	Delphinium Staphisagria,
Stavesacre.	*The Seed.*
Stramonii Folium,	Datura Stramonium,
Leaf of Stramonium.	*The Leaf.*

Stramonii Semen, *Seed of Stramonium.*	*The Seed.*
Strychnia, *Strychnia.*	*An Alkali prepared from Nux-vomica,* *The crystals.*

It is dissolved in boiling rectified spirit. It melts when heated, and if the heat be increased, is destroyed. Taste extremely bitter; this being endued with violent powers is to be most cautiously administered.

Styrax, *Storax.*	Planta incerta, *An unknown Plant,* *The liquid Balsam.*
Sulphur, *Sulphur.*	Sulphur *sublimatum,* *Sublimed* Sulphur.

Lemon-coloured, sublimes at a heat of 600°. It is dissolved in oil of turpentine assisted by heat.

Sulphur præcipitatum, *Precipitated Sulphur.*	Sulphur, *precipitated from Sulphuret of Calcium by Hydrochloric Acid.*

Pale yellow. Water in which it has been boiled does not change the colour of litmus to red. It corresponds in other respects with what is above stated as to sulphur.

Tabacum, *Tobacco.*	Nicotiana Tabacum, *The Leaf.*
Tamarindus, *Tamarind.*	Tamarindus Indica, *The Pulp of the Fruit.*
Taraxacum, *Dandelion.*	Taraxacum Dens-leonis, (*Leontodon Taraxacum*), *The fresh Root.*
Terebinthina (*Americana*), (*Terebinthina vulgaris, Ph.* 1836), *Turpentine* (*American*).	Pinus palustris, et P. Tæda, *The Oleo-resin flowing from the trunk deprived of bark.*
Terebinthina Chia, *Chio Turpentine.*	Pistacia Terebinthus, *The Oleo-resin flowing from the incised trunk.*

Terebinthinæ Oleum, *Oil of Turpentine.*	*An Oil distilled from Turpentine, rectified.*
Thus, *Frankincense.*	Abies excelsa, et Pinus palustris, *The Turpentine exuded from the bark, hardened by the air.*
Tiglii Oleum, *Croton Oil.*	Croton Tiglium, *The Oil expressed from the Seed.*
Tormentilla, *Tormentil.*	Potentilla Tormentilla, *The Rootstock.*
Tragacantha, *Tragacanth.*	Astragalus verus, *The Juice exuded from the bark, indurated by the air.*
Valeriana, *Valerian.*	Valeriana officinalis, *The Root of the wild herb.*
Veratria.	Asagræa officinalis (LINDL.), *An Alkali procured from the Seed.*

Least soluble in water, more in ether, but most in rectified spirit. No odour, but irritates the nostrils exceedingly, tastes acrid. It must be most cautiously administered.

Veratrum, *White Hellebore.*	Veratrum album, *The Rootstock.*
Vinum Xericum, *Sherry Wine.*	
Viola, *Violet.*	Viola odorata, *The fresh Petal.*
Ulmus, *Elm.*	Ulmus campestris, *The inner Bark.*
Uva, *Raisins.*	Vitis vinifera, *The prepared Fruit.*
Uva ursi, *Whortleberry.*	Arctostaphylos Uva-ursi, *The Leaf.*
Zinci Sulphas, *Sulphate of Zinc.*	Zinci Sulphas, *The crystals.*

It is dissolved in water. What is precipitated by ammonia is white; but the same added in excess it is again dissolved. What is precipitated either by chloride of barium or by acetate of lead, is not dissolved by diluted nitric acid. What is precipitated by sesquicarbonate of ammonia, from 100 grains dissolved in water, is reduced by a strong heat to 27·9 of oxide of zinc.

Remarks.—If this salt be impure owing to the presence of sesquioxide of iron, the precipitate first occasioned by ammonia will not be redissolved by excess of it, but some yellowish sesquioxide of iron will remain. Chloride of barium precipitates sulphate of barytes, and acetate of lead, sulphate of lead, neither of which dissolves in diluted nitric acid. Sesquicarbonate of ammonia precipitates carbonate of zinc, from which heat expels the carbonic acid and leaves oxide of zinc.

Zincum,
Zinc.

Specific gravity 6·86. It is soluble in nitric acid. What is precipitated by ammonia, is again dissolved by it when added in excess.

Zingiber, *Ginger.*	Zingiber officinale, (ROSCOE), *The Rootstock.*

PART II.

PREPARATIONS AND COMPOUNDS.

ACIDA.

ACIDS.

ACETUM DESTILLATUM.

Distilled Vinegar.

Acetum Distillatum, P.L. 1721*, P.L. 1746, P.L. 1788.
Acidum Aceticum, P.L. 1809.
Acidum Aceticum Dilutum, P.L. 1824.
Acetum Destillatum, P.L. 1836.

Take of Vinegar a gallon;
Let seven pints distil in a sand-bath.

Its specific gravity is 1·0065. A fluidounce of it is saturated by 57 grains of the crystals of carbonate of soda.

Remarks.—Vinegar, as has already been stated, is impure and very dilute acetic acid; it is prepared in wine countries by exposing wine to the action of air and warmth, by which its alcohol is converted into acetic acid, owing to the absorption of oxygen. On the Continent, Vinegar is also made by "The Quick Process," which is to let very dilute spirit of wine trickle over wood-shavings contained in a large vat, through which a current of warm air is continually passing, and rapidly oxidizing the alcohol. In this country it is usually made by fermenting an infusion of malt, and it is hence called *Malt Vinegar*.

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* The dates of the Pharmacopœias are those of the Orders in Council.

Wine and fermented saccharine infusions, when exposed to air and warmth, undergo what is commonly called the acetous fermentation, *i.e.* they undergo an *eremacausis* of the alcohol they contain. The alcohol $C^4 H^6 O^2$ is converted into *aldehyde* by two equivalents of oxygen depriving it of two equivalents of its hydrogen, forming two equivalents of water. The aldehyde $C^4 H^4 O^2$ now unites with two equivalents of oxygen and produces acetic acid and water, so that one equivalent of alcohol is converted into one equivalent of acetic acid and three equivalents of water.

Properties, Adulterations, Impurities, and Tests of Vinegar.—See Acetum, *Materia Medica.*

Acetum Destillatum. *Process.*—By distillation vinegar is freed from colouring matter, sulphuric acid, a little tartaric acid, sugar, and such other impurities as are not volatile, these remaining in the retort after distillation; but the alcohol and a portion of mucilage rise and are condensed with the distilled vinegar, which usually contains a little alcohol, acetic ether, mucilage and much water. Of whatever material the body of distilling vessel may be made, the head, worm, and receiver should be of glass or earthenware, to prevent any metallic impregnation of the distilled vinegar.

Properties.—Distilled Vinegar is colourless and transparent, but its odour and flavour are less agreeable than before distillation, its taste being flat and its smell empyreumatic; the latter is probably derived from the decomposing action of heat upon the colouring matter and mucilage. It reddens litmus-paper strongly. It should contain nearly 4·6 per cent. of real acetic acid. When vinegar is saturated with potash or soda, the resulting acetates are brown and impure, owing to the decomposition of the mucilage; on this account, and because it is dear and dilute, distilled vinegar is scarcely ever employed in the preparation of acetates.

Impurities and Tests.—Totally vaporized by heat, showing the absence of fixed impurity. Non-precipitation by chloride of barium proves that no sulphuric acid is present, if contaminated with hydrochloric acid or a chloride, nitrate of silver gives a precipitate insoluble in nitric acid, but soluble in ammonia. When hydrosulphuric acid gives a black precipitate, lead or copper may be suspected.

Incompatibles.—Alkalis, alkaline carbonates, alkaline and other earths, metallic oxides and carbonates, many metals and other substances acted upon by acids in general.

Pharmacopœia Preparations.—Acetum. Ceratum Saponis Compositum, Linimentum Æruginis.

Pharmacopœia Preparations.—Acetum Destillatum. Acidum Aceticum dilutum is now substituted in every case for Distilled Vinegar.

ACETUM CANTHARIDIS. (*Epispasticum*).

Vinegar of Cantharides. (*Epispastic.*)

Acetum Cantharidis, P.L. 1836.

Take of Cantharides, rubbed to very fine powder, two ounces,
Acetic Acid a pint;

Macerate the Cantharides with the Acid for eight days, frequently shaking them. Lastly, press and strain.

Medicinal Use.—This preparation was for the first time introduced into the last Pharmacopœia. It is employed as an extemporaneous blister. It may be conveniently applied by a sponge, producing a blister in five or ten minutes.

For additional Remarks,—See *Emplastrum Cantharidis.*

ACETUM COLCHICI.

Vinegar of Meadow Saffron.

Acetum Colchici, P.L. 1809, P.L. 1824, P.L. 1836.

Take of the Cormus of Meadow Saffron, dried, three drachms and a half,
Diluted Acetic Acid a pint,
Proof Spirit a fluidounce and a half;

Macerate the Meadow Saffron with the Acid in a closed vessel for three days; then press out [the liquor] and set it by, that the dregs may subside; lastly, add the Spirit to the strained liquor.

Remarks.—Two alterations have been made in the last formula for this preparation; the dried Cormus is substituted for the fresh, and Diluted Acetic Acid is employed instead of distilled vinegar. Colchicum is a common indigenous plant belonging to the natural family *Melanthaceæ.* Some recommend the Cormus to be gathered in August and dried entire. Pelletier and Caventou state that the cormus consists of elaine, stearine, a volatile acid, an acid gallate of veratria (*colchicia?*), yellow colouring matter, gum, starch, a large quantity of inulin, and woody fibre. The dried cormus is often worthless from bad drying or gathering at improper seasons. When good the slices are firm, and notched only on one side. It is poisonous. The active principle of meadow saffron appears to reside in a vegetable alkali, to which Hesse and Geiger, who have examined its properties, have given the name of *Colchicia.*

Colchicia is prepared by digesting the seed of meadow saffron in boiling alcohol, which dissolves an acid salt; this is to be precipitated by magnesia, and what is thrown down again treated with boiling alcohol, which by evaporation deposits colchicia. In this process the magnesia combines with the acid previously united with the colchicia, which is precipitated with the excess of magnesia and dissolved in an uncombined state by the second portion of alcohol. Colchicia crystallizes in slender needles; it is inodorous, its taste is first bitter and afterwards biting, but not so acrid as veratria, from which it also differs in not exciting sneezing, and in being soluble in water.

Hydrate of colchicia is feebly alkaline to tests, it completely neutralizes acids and forms crystallizable salts with them, which veratria does not. Its salts have a bitter taste. The aqueous solution of this alkali precipitates a solution of chloride of platinum. Nitric acid turns it deep violet, blue, and afterwards quickly green and yellow. It has not been analysed.

Incompatibles.—Alkalis, their carbonates, the alkaline earths and their carbonates, or any substances on which vinegar is capable of exerting any action.

Medicinal Use.—Diuretic. Dose, f ʒss to f ʒij in any bland fluid. It is employed in gout and rheumatism.

ACETUM SCILLÆ.

Vinegar of Squill.

Acetum Scilliticum, P.L. 1721, P.L. 1746.

Acetum Scillæ, P.L. 1788, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Squill, recently dried and bruised, two ounces and a half,
Diluted Acetic Acid a pint,
Proof Spirit a fluidounce and a half;

Macerate the Squill with the Acid with a gentle heat in a closed vessel, for three days; then press out [the liquor] and set it by, that the dregs may subside; lastly, add the Spirit to the strained liquor.

Remarks.—The quantity directed to be made is much reduced from the last Pharmacopœia, but the proportions are retained. The squill is found on and imported from the shores of the Mediterranean, and belongs to the natural family *Liliaceæ.* Dried squill occurs in yellowish translucent slices of an acrid nauseous taste. Vogel found this bulb to consist of gum, a large quantity of bitter principle (scillitin), tannin, citrate of lime, sugar and ligneous matter; this analysis is confirmed in its chief characteristics by Tilley. Squill contains a peculiar vegetable product to which the name of *scillitin* has been given; it is prepared by the action of spirit upon dried squill, evaporating the solution after the alcohol has been distilled from it, and treating the residue again with spirit and with ether. Scillitin is of a bright yellow colour, and is at first obtained in flocks; these soften in hot water and unite into a mass which becomes brown and brittle by drying. Its taste is very acrid and bitter; when heated it fuses, swells and exhales, at first an aromatic, and afterwards an urinous smell. It is perfectly soluble in alcohol, but not in ether; dilute acids have no action upon it. M. Lebourdais describes scillitin as being incrystallizable, neutral, and of an acrid taste; readily decomposed by heat, dissolving in sulphuric acid with a purple colour rapidly passing into black. It has not been analysed.

It is to be observed that very different accounts of the nature and properties of scillitin have been given by several chemists.

Incompatibles.—The same as with the last preparation.

Pharmacopœia Preparation.—Oxymel Scillæ.

Medicinal Use.—Expectorant and diuretic. fʒss to fʒjss in any aromatic water.

ACIDUM ACETICUM DILUTUM.

Diluted Acetic Acid.

Take of Acetic Acid twenty-three fluidrachms,
Distilled Water a pint.

To the Acid add as much Water as may be necessary, that it may accurately fill a pint measure and mix.

The specific gravity is 1·008. A fluidounce of it is saturated by 57 grains of the crystals of carbonate of soda.

Impurities, Tests, and Incompatibles.—The same as for distilled vinegar, except that it does not give brown-coloured acetates with the alkalis on account of the absence of mucilage. It may also contain traces of sulphurous acid gas.

Pharmacopœia Preparations.—Acetum Colchici, Acetum Scillæ, Emplastrum Ammoniaci, Liquor Ammoniæ Acetatis, Unguentum Plumbi Compositum.

*ACIDUM ACETICUM**, P.L. 1836.

Acetic Acid.

Acidum Acetosum, P.L. 1788.
Acidum Aceticum Fortius, P.L. 1824.

Take of Acetate of Soda two pounds,
Sulphuric Acid nine ounces,
Distilled Water nine fluidounces;

Add the Sulphuric Acid, first mixed with the Water, to the Acetate of Soda put into a glass retort, then let the Acid distil in a sand-bath. Care is to be taken that the heat, towards the end, be not too much increased.

When wood is heated and decomposed in iron cylinders to which a distilling apparatus is attached, the residue obtained is charcoal, and by condensing the vapours, a liquid is obtained consisting of acetic acid mixed with water and rendered impure by various other products; it was originally called pyroligneous acid, and this name, while in its impure state, it yet retains; it is formed by the recomposition of the various compounds of the carbon, oxygen, and hydrogen originally existing in the wood.

Pyroligneous acid has a peculiarly strong disagreeable smell; it is of a dark brown colour, owing to the presence of tarry matter; a part of this is separated by re-distillation; the acid is then, by saturation with soda, converted into acetate of soda, which after purification by torrefaction and repeated crystallizations, is used in the preparation of acetic acid.

This salt when crystallized is colourless and inodorous, with a saline sweetish taste; the primary form is an oblique rhombic prism; 100 parts require 286 of cold water to dissolve them, and about 500 parts of alcohol; by exposure to dry air, it slowly effloresces. When moderately heated it melts in its water of crystallization, and at 202° it becomes anhydrous, but may be heated to 600° without undergoing decomposition; at a red heat it is

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* The Acidum Aceticum of the late Pharmacopœia has been removed to the Materia Medica, consequently no formula is now given for preparing it. I shall, however, introduce the late process, accompanied with observations on Acetic Acid in conformity with the plan of the several editions of my former Translations; and in most other cases, where a similar removal has taken place, I have adopted the same plan. The alteration of type will, I trust, sufficiently distinguish the restored formulæ.

decomposed, the residue being a mixture of carbonate of soda and charcoal.

Anhydrous Acetate of Soda is composed of

One equivalent of Soda	32	38·55
One equivalent of Acetic Acid	51	61·45
Equivalent	83.	100·

Formula . . . . . $NaO, C^4 H^3 O^3$.

In the crystallized state it consists of

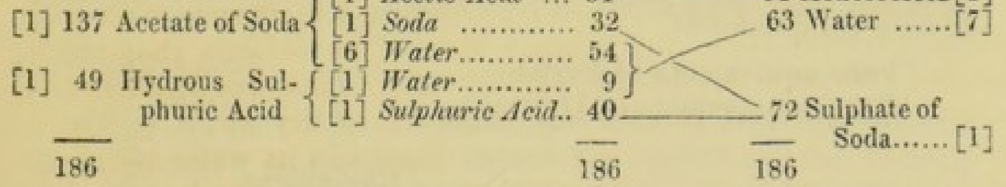
One equivalent of Soda	32	23·37
One equivalent of Acetic Acid	51	37·23
Six equivalents of Water . . . . 9×6=	54	39·40
Equivalent	137.	100·

Formula . . . . . . $NaO, C^4 H^3 O^3, 6HO$.

Process.—The changes which occur in the preparation of acetic acid are these :—one equivalent 137 of acetate of soda, is composed of one eq. of *acetic acid* 51, one eq. of *soda* 32, and six eqs. of *water* 54 ; one eq. of hydrous sulphuric acid consists of one eq. of *water* 9, and one eq. of *sulphuric acid* 40.

When the salt and acid act upon each other, the acetate of soda is decomposed, the 32 of soda combine with the 40 of sulphuric acid to form 72 of sulphate of soda, which remains in the retort; while the 51 of acetic acid liberated, rising in vapour with the 54 of water of crystallization, and 9 the water of the hydrous sulphuric acid, is condensed in the receiver, forming a compound of 51 of acetic acid and 63 of water, which diluted by the nine fluidounces of water added, forms the ACETIC acid of the Pharmacopœia.

The following diagram will further explain the changes described :—



One hundred grains of the acetic acid, prepared according to directions above given, saturate 87 grains of crystallized carbonate of soda, and as 144 of this salt are equivalent to 51 of real acid, it follows that this acetic acid is composed of

Anhydrous Acètic Acid	30·8
Water	69·2
	100·

A mixture of 15 parts by weight of this acid, and 85 of water, is equal in strength to distilled vinegar.

Properties and Composition.—Acetic acid has never been obtained except in combination with water or with a base, so that the acid in the anhydrous state is not known. When of the greatest strength obtainable, it was formerly called *Radical Vinegar.* It is limpid and colourless, and its taste is acrid until considerably diluted with water, and then it is agreeably acid, being devoid of the empyreumatic flavour of distilled vinegar. Its acid powers are strongly marked; it reddens litmus paper, and decomposes the alkaline, earthy, and metallic carbonates with effervescence; when of the greatest strength, however, it will not act on carbonate of lime, the addition of water being requisite.

Acetic acid is volatile at common temperatures, and hence its pungent odour; its vapour, especially when arising from the heated acid, is inflammable, burning with a white light. Its salts are termed *acetates*; they are decomposed by most acids, with the evolution of acetic acid; carbonic acid does not, indeed, in general, produce this effect, but there are one or two cases in which it decomposes the acetates.

Anhydrous Acetic Acid, as it exists in dry acetate of soda and other anhydrous salts, is composed of

Four equivalents	of Carbon	6×4=24	47·06
Three ,,	of Hydrogen	1×3= 3	5·88
Three ,,	of Oxygen	8×3=24	47·06
	Equivalent	51.	100·

Formula, of the anhydrous acid ...... $C^4 H^3 O^3$,

Of the monohydrated, or *glacial acetic acid,* which crystallizes at a temperature of 45°,...$C^4 H^3 O^3$, HO.

Acetic acid has also been called *acetylic acid,* being regarded as consisting of a supposed compound base *acetyle,* which however has never been isolated, and oxygen. Acetyle is considered to be a compound of

Four equivalents of Carbon	6×4=24
Three equivalents of Hydrogen	1×3= 3
Equivalent	27

which, when combined with

Three equivalents of Oxygen	8×3=24
forms one Equivalent of Acetylic Acid	51

The formula of Acetyle is $C^4 H^3$.

Impurities and Tests.—M. Laroque detects the presence of sulphurous in acetic acid by adding to it protochloride of tin, and heating the mixture to about 150°. If there is much sulphurous acid, a yellowish precipitate, changing to brown, of sulphuret of tin will be formed; if, on the contrary, there is a mere trace of this impurity, the solution yields no precipitate, but when a few drops of a solution of sulphate of copper is added to the liquor, if any sulphurous acid be present, a brown precipitate of sulphuret of copper is immediately produced. See also MATERIA MEDICA: *Acidum Aceticum.*

Incompatibles.—See ACETUM DESTILLATUM.

Pharmacopœia Preparations.—Acetum Cantharidis, Acidum Aceticum dilutum, Extractum Colchici Aceticum, Liquor Morphiæ Acetatis, Oxymel, Potassæ Acetas.

Medicinal Uses.—Undiluted Acetic Acid acts quickly and powerfully on the skin. It is used as a caustic to destroy corns and warts, the latter especially if of a syphilitic origin. When diluted it is refrigerant, and may be advantageously administered in hæmorrhage; especially in cases where the acetate of lead has been given, since the solubility of this salt is much increased by it. Externally it is a useful adjunct to lotions containing lead.

ACIDUM HYDROCHLORICUM DILUTUM.

Diluted Hydrochloric Acid.

Acidum Hydrochloricum Dilutum, P.L. 1836.

Take of Hydrochloric Acid five fluidounces,
Distilled Water fifteen fluidounces;
Mix.

Its specific gravity is 1·043. A fluidounce of this acid is saturated by 168 grains of the crystals of carbonate of soda.

Impurities and Tests.—This diluted acid, like the concentrated from which it is prepared, should be colourless, and entirely vaporized by heat. Neither ammonia, chloride of barium, nor sesquicarbonate of ammonia should occasion any precipitation in it. To detect sulphurous acid see ACETIC ACID: *Impurities and Tests.*

Incompatibles.—Alkalis, earths, oxides and their carbonates, sulphuret of potassium, tartrate of potash, potassio-tartrate of antimony, preparations of potash and of soda, nitrate of silver, acetate of lead, and all substances in general which are acted upon by acids.

Medicinal Use.—According to Dr. Paris it may be advantageously employed in malignant cases of scarlatina and typhus; and mixed with a strong infusion of quassia, he considers it to be the most efficacious remedy for preventing the generation of worms. Dose ♏xx to f℥i. Diluted hydrochloric acid is also an excellent addition to gargles for ulcerated sore throat.

The formula for preparing Hydrochloric Acid is now omitted from the Pharmacopœia. The following is that inserted in the last:

ACIDUM HYDROCHLORICUM. P.L. 1836.

Hydrochloric Acid.

Spiritus Salis, P.L. 1721.
Spiritus Salis Marini Glauberi, P.L. 1746.
Acidum Muriaticum, P.L. 1788, 1809, 1824.

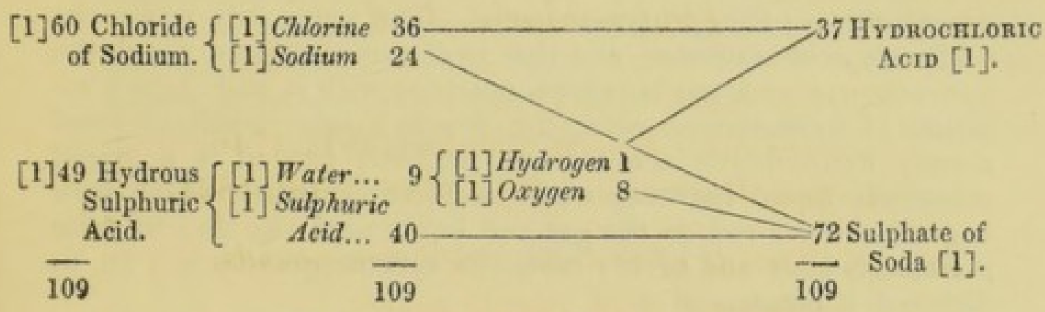
Take of Chloride of Sodium, dried, two pounds,
Sulphuric Acid, twenty ounces,
Distilled Water, twenty-four fluidounces;

Add the Acid, first mixed with twelve fluidounces of the Water, to the Chloride of Sodium put into a glass retort. Pour what remains of the Water into a receiver; then, the retort being fitted to it, let the Acid, distilled in a sand-bath, pass over into this water, the heat being gradually increased.

Process.—The Acidum Hydrochloricum of the Pharmacopœia is an aqueous solution of hydrochloric acid gas; this acid may be obtained in its gaseous state in several modes; first, when equal volumes (or measures) of hydrogen gas and chlorine gas are mixed and exposed to daylight, they combine slowly to form this acid gas; in the sunshine, or by the taper or the electric spark, the union is effected instantaneously and with explosion, and the combination occurring without any alteration of volume, there remains hydrochloric acid gas equal in bulk to the two volumes of the elementary gases employed. The best method of procuring the gas is that of decomposing chloride of sodium by sulphuric acid. The changes which take place are these:

One eq. of common salt or chloride of sodium 60, is composed of one eq. of *chlorine* 36, and one eq. of *sodium* 24; one eq. of hydrous sulphuric acid consists of one eq. of *water* 9, and one eq. of *sulphuric acid* 40, the 9 of water are composed of one eq. of *hydrogen* 1. and one eq. of *oxygen* 8. When the salt, water, and acid act upon each other, the changes that occur are the following: the chloride and water are both decomposed, the 36 of chlorine yielded by the former unite with the 1 of hydrogen supplied by the latter, and form 37 of HYDROCHLORIC ACID GAS, while the 24 of sodium combining with the 8 of oxygen, constitute 32 of oxide of sodium or soda, and these combining with the 40 of sulphuric acid, form 72 of sulphate of soda, which remains in the retort. The use of the water with which the sulphuric acid is diluted will be presently stated.

The annexed diagram will explain the reactions above described:



Properties.—Hydrochloric Acid Gas is colourless and invisible; at common temperatures and under the usual pressure, it is permanently elastic; when, however, at the temperature of 50°, it is subjected to a pressure of 40 atmospheres, it is rendered liquid; but when the pressure is removed, it immediately reassumes the gaseous state. Hydrochloric acid gas has a pungent odour, an acid and acrid taste, and is quite irrespirable and uninflammable; it reddens litmus paper strongly, and evinces all the other properties of a powerful acid. It has great affinity for water, when it escapes into the air combining with its moisture so as to form a white vapour, and yielding dense white fumes when exposed to ammoniacal vapours; a few drops of water introduced into a jar of the gas immediately causes its absorption. Water at 40° is capable of dissolving nearly 480 times its bulk of this gas. It is not altered by heat, but by electricity it is partially decomposed. When this acid is required in its gaseous state, it must, on account of its ready solubility in water, be received in glass jars filled with and inverted in mercury.

Composition.—It has been already observed that this compound gas consists of equal volumes of its elementary gases, and

50 cubic inches of Hydrogen gas weigh	1·075 grs.
50 cubic inches of Chlorine gas	38·700 —
100 cubic inches of Hydrochloric Acid gas weigh..	39·775 grs.

Its specific gravity is 1·2830, air = 1. Berzelius gives 1·2546 as its specific gravity.

By weight it is composed of

One equivalent of Hydrogen	1 or	2·7
One „ of Chlorine	36 „	97·3
Equivalent........	37.	100·

Formula...... H Cl.

Analytical proof of the nature of hydrochloric acid gas is derived from heating binoxide of mercury in it; the new products are bichloride of mercury and water, resulting from the double decomposition of the original compounds, and the fresh arrangement and recombination of their elements.

Properties of Solution of Hydrochloric Acid, the Acidum Hydrochloricum of the Pharmacopœia.—The water with which the sulphuric acid is diluted, and that in the receiver into which the hydrochloric acid gas is passed, combine with it and form a solution of hydrochloric acid, for brevity's sake usually termed merely hydrochloric acid: when perfectly pure it is a limpid colourless liquid emitting white suffocating fumes, which turn vegetable blues red, as the gas and liquid acid also do; its taste is strongly sour and acrid; when its specific gravity is 1·16, as directed, it consists of

Hydrochloric Acid Gas......	34
Water....................	66
	100.

This acid acts upon various bodies, and in most cases it is decomposed, undergoing changes which I shall now describe.

When it combines with the vegetable alkalis, as morphia, quina, &c., it is supposed to do so without alteration; thus hydrochloric acid and morphia unite to form hydrochlorate of morphia, the formula of the resulting compound being $C^{35}H^{20}\,O^{6}N$, H Cl, neither the acid nor alkali being decomposed.

When zinc is put into hydrochloric acid, action ensues, hydrogen gas is evolved, and chloride of zinc is formed and remains in solution; in this case the hydrochloric acid is decomposed, its hydrogen being liberated, while its chlorine combines with the zinc, the changes being represented by $Zn, HCl = Zn\,Cl, H$. If oxide of zinc be dissolved in the acid, then both acid and oxide are decomposed, chloride of zinc, as in the last case, is formed, but no hydrogen gas is evolved, for the oxygen of the oxide combining with it, water results, as explained by the formula $ZnO, HCl = Zn\,Cl, HO$. When two equivalents of hydrochloric acid act upon one equivalent of binoxide of mercury, there result one equivalent of bichloride of mercury and two equivalents of water, $HgO^{2}, 2HCl = Hg2Cl, 2HO$. With an equivalent of binoxide of manganese the changes are different, then one equivalent of protochloride of manganese and two equivalents of water are formed, whilst one equivalent of chlorine is liberated in the gaseous state, $MnO^2, 2HCl = MnCl, Cl, 2HO$. When ammonia is added to hydrochloric acid, sal-ammoniac is formed, neither the base nor acid being decomposed, on the supposition that the resulting salt is hydrochlorate of ammonia NH^3, HCl; many chemists, however, consider that both are decomposed, the result being chloride of ammonium, a hypothetical base not hitherto obtained in a separate state, its assigned formula being NH^4; on this supposition $NH^3\ HCl = NH^4\ Cl$ is the formula of this salt.

Incompatibles.—See ACIDUM HYDROCHLORICUM DILUTUM.

Impurities and Tests.—See MATERIA MEDICA: *Acidum Hydrochloricum.*

Pharmacopœia Preparations.—Acidum Hydrochloricum Dilutum, Ferri Ammonio-chloridum, Tinctura Ferri Sesquichloridi, Liquor Arsenici Chloridi, Zinci Chloridum.

Medicinal Uses.—See ACIDUM HYDROCHLORICUM DILUTUM.

ACIDUM HYDROCYANICUM DILUTUM.

Diluted Hydrocyanic Acid.

Acidum Hydrocyanicum Dilutum, P.L. 1836.

Take of Ferrocyanide of Potassium two ounces,
Sulphuric Acid seven fluidrachms,
Distilled water a pint and a half.

Mix the Acid with four fluidounces of the water; and to these, when cooled and put into a retort, add the Ferrocyanide first dissolved in half a pint of the water. Pour eight fluidounces of the water into a cooled receiver; then, the retort being fitted on, let six fluidounces of Acid, distilled with a gentle heat in a sand-bath, pass into this water. Lastly add six more fluidounces of distilled water, or as much as may be sufficient, that 12·59 grains of nitrate of silver, dissolved in distilled water, may be accurately saturated by 100 grains of this Acid.

Free from colour; goes off in vapours by heat, exhaling a peculiar odour. It turns litmus of a slight fugaceous red colour. It does not become red on the addition of the iodo-cyanide of potassium and mercury. Hydrosulphuric acid being added does not discolour it. Chloride of barium being added it precipitates nothing. In 100 grains of this diluted acid there are contained two grains of hydrocyanic acid.

Remarks.—The total evaporation of the hydrocyanic acid shows the absence of fixed impurity. If it redden litmus paper strongly and permanently, then some other acid is mixed with it; the absence of metallic matter in general is indicated by the non-action of hydrosulphuric acid. Any acid mixed with it decomposes the iodo-cyanide of potassium and mercury, and forms biniodide of mercury, which is of a scarlet colour. In this process the College have substituted seven fluidrachms for an ounce and a half of sulphuric acid. This acid was first obtained by Scheele in 1782, and as it was procured, though intermediately, from Prussian blue, it was originally called Prussic acid; its present appellation was given to it for reasons presently to be stated. It appears extremely probable that this acid exists ready formed in several vegetable products; for when the leaves of the cherry-laurel, the peach-tree, or some other substances are subjected to distillation, the distilled fluid has a peculiar smell analogous to, but distinguishable from, that of hydrocyanic acid, and which produces, after a certain time, Prussian blue when added to a saturated solution of iron in carbonic acid. It is however possible that the hydrocyanic acid thus obtained is a product and not an educt, and then only its elements exist in the substances which yield it by distillation; in the mode, however, in which it is here directed to be prepared, it is unquestionably an artificial product.

Ferrocyanide of Potassium is a well-known salt, frequently called *prussiate of potash*, or *prussiate of potash and iron.* It is prepared by heating to redness a mixture of pearlash and dried animal matter, such as hoofs, horns, or blood, in an iron vessel. By their mutual decomposition and action of the product on the iron, a coaly mass is obtained, which is partially soluble in water, the solution from which by evaporation yields large translucent crystals of a fine yellow colour; the primary form of which is an octahedron with a square base. Liebig's theory of this process is, that when nitrogenized animal substances are fused with carbonate of potash at a strong heat the potassium is reduced by the carbon, which acting on the nitrogenized compounds of the carbonaceous mass forms cyanide of potassium. The solution of this salt, acting on the metallic iron disseminated through the coaly mass, dissolves it with absorption of oxygen, acquires a yellow colour and yields ferrocyanide of potassium. This salt is inodorous; its taste is rather saline; water at 60° dissolves about one third, and at 212° its own weight of this salt: it is insoluble in alcohol; when moderately heated it loses about 13 per cent. of water, and becomes colourless; when heated to redness it is decomposed into carburet of iron and cyanide of potassium, but by the action of air it is converted into cyanate of potash, and oxide of iron. When the aqueous solution of ferrocyanide of potassium is mixed with one of a perfectly pure protosalt of iron, a white precipitate is formed, which speedily becomes blue by exposure to the air; and this, as well as the blue precipitate obtained at once from the salts of sesquioxide of iron, is Prussian blue, or the percyanide of iron.

Composition.—This salt may be regarded under two points of view; first, as consisting of ultimate elements; and secondly, as formed of compounds of these elements. According to Berzelius, by ultimate analysis it yields:

Six equivalents	of Carbon ...	6×6	$=36$	or 16·94
Three ,,	of Nitrogen..	14×3	$=42$	,, 19·76
One ,,	of Iron......		28	,, 13·14
Two ,,	of Potassium	40×2	$=80$	,, 37·54
Three ,,	of Water....	9×3	$=27$	,, 12·62
	Equivalent		213.	100·

One equivalent of Anhydrous Ferrocyanide of Potassium	186	,, 87·38
Three equivalents of Water	27	,, 12·62
One equivalent of Crystallized Ferrocyanide of Potassium	213.	,, 100·

The experiments of Gay-Lussac have, however, rendered it more than probable that the carbon and nitrogen exist in combination, forming a distinct compound which he terms *cyanogen*, from Greek words signifying to *generate blue*, because it is necessary to the production of Prussian blue. Cyanogen is obtained by heating bicyanide of mercury in a retort: the properties of cyanogen are that it is gaseous, colourless, and transparent, its smell is penetrating, and somewhat resembles that of bitter almonds. A taper immersed in it is extinguished, but it burns at the surface where it is in contact with the oxygen of the air; the flame has a peculiar and characteristic peach-blossom colour, and the results of the combustion are nitrogen and carbonic acid gases.

The specific gravity of cyanogen gas is to that of air as 1·806 to 1; 100 cubic inches weigh 55·9 grains (56·472 grains, Turner); water dissolves about 4·5 volumes of this gas, and alcohol 23 volumes; when exposed to a temperature of 45°, under a pressure of between 3 and 4 atmospheres, this gas was reduced by Dr. Faraday to a fluid rather lighter than water. At a temperature of 30° below zero it becomes a crystalline solid. It is composed of

Two equivalents of Carbon	6×2	$=12$
One " of Nitrogen		14
Equivalent		26

Formula...... C^2N or Cy.

It is therefore a Bicarburet of Nitrogen.

Supposing, then, that the carbon and nitrogen exist as cyanogen combined with the metals, the ferrocyanide of potassium consists of

One equivalent of Cyanide of Iron	$26+28$	$= 54$
Two " of Cyanide of Potassium..	$52+80$	$=132$
Three " of Water	9×3	$= 27$
Equivalent......		213

Formula....... FeCy, 2KCy, 3HO.

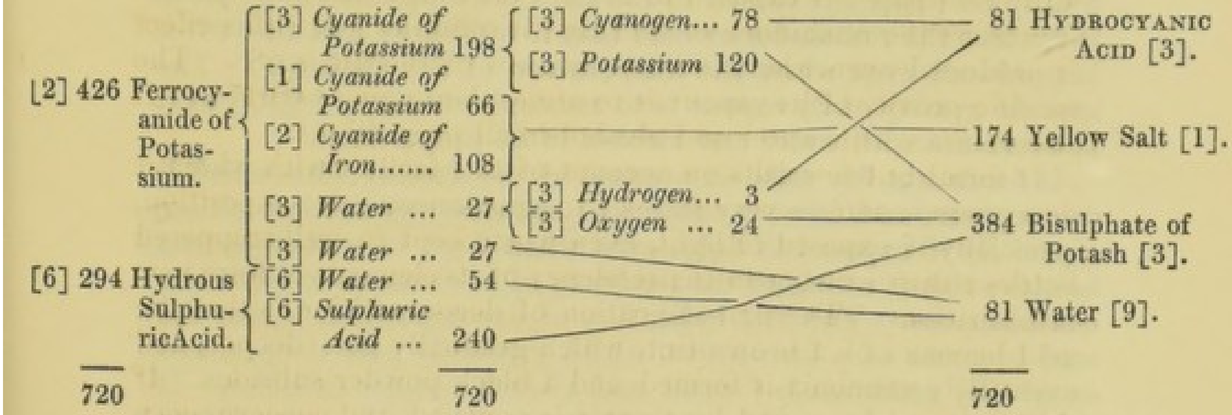
Cyanogen is capable of uniting with various bodies, as with hydrogen, chlorine, and the metals in a similar manner to an elementary body, forming a hydracid with the first-named gas; but this union seldom takes place by direct action; it is therefore usually requisite to have recourse to intermediate action.

Process.—It appears from the experiments of the late Mr. Everitt (London and Edinburgh Phil. Mag., Feb. 1835), that when 6 eqs. of sulphuric acid are heated with 2 eqs. of ferrocyanide of potassium, the action that ensues is as follows: Two eqs. of ferrocyanide of potassium contain 4 eqs. of *cyanide of potassium*, of which only 3 eqs. are decomposed, as are also 3 eqs. of *water*, the 3 eqs. of *oxygen* of which combine with 3 eqs. of *potassium* and form 3 eqs. of potash, and these unite with the 6 eqs. of sulphuric acid to form 3 eqs. of bisulphate of potash; the 3 eqs. of *hydrogen* of the decomposed water unite with the 3 eqs. of *cyanogen* separated from the potassium and constitute with them 3 eqs. of HYDROCYANIC ACID. There remain undecomposed 1 eq. of cyanide of potassium, and the 2 eqs. of cyanide of iron, and these combining form a double cyanide of iron and potassium, which is called by the chemist above quoted *yellow salt*, the constitution of which, it will be observed, is precisely the converse of that of the ferrocyanide of potassium, with respect to the proportions of the cyanides.

The annexed statement will show how, according to Mr. Everitt, the various constituents of the acid and salt are disposed of, except, indeed, that the quantity of water distilled with the hydrocyanic acid is not given:

Submitted to Distillation.		*Results of Distillation.*	
6 eqs. Sulphuric Acid	240	3 eqs. Bisulphate of Potash	384
4 — Cyanide of Potassium	264	3 — Hydrocyanic Acid	81
2 — Cyanide of Iron	108	1 — Cyanide Potassium 66 } Yellow Salt	174
12 — Water {6 in the Acid 6 in the Salt}	108	2 — Cyanide Iron ... 108 }	
		9 — Water	81
	720		720

The subjoined diagram represents the decompositions and interchanges which take place.



It will be noticed, that the proportions of sulphuric acid and ferrocyanide of potassium here mentioned do not differ much from those directed in the Pharmacopœia; but a large quantity of water is used with them in the latter case, to prevent the waste of hydrocyanic acid which would occur, for want of condensation, without it.

I shall briefly notice the process employed by Gay-Lussac to prepare this acid, because it is that by which it is procured of the greatest strength, and consequently best exhibits its peculiar properties. He put into a retort some bicyanide of mercury, to which he adapted a tube of about two feet in length, and half an inch in diameter; one third of this tube, and that nearest the retort, had pieces of marble put into it, while the remaining two thirds were occupied by chloride of calcium. On the bicyanide of mercury were poured about two thirds of its weight of concentrated hydrochloric acid, and a gentle heat was applied. Any undecomposed hydrochloric acid was absorbed by the marble, and all moisture by the chloride of calcium. During this operation the *chlorine* of the hydrochloric acid combines with the *mercury* of the bicyanide to form bichloride, which remains in the retort, while the *hydrogen* of the hydrochloric acid takes the *cyanogen* of the bicyanide, and these form HYDROCYANIC ACID, which is vaporized, and afterwards condensed in a receiver cooled by ice. Any portion of the hydrocyanic acid which may be condensed on the fragments of marble, is to be volatilized by a gentle heat and driven into the receiver.

Anhydrous hydrocyanic acid thus obtained, is a colourless liquid with a strong odour resembling that of bitter almonds; its taste is first cooling and afterwards burning, and it is very poisonous. Its specific gravity is 0·697; it boils at about 80°, becomes solid at 5° of Fahrenheit, and crystallizes in fibres like nitrate of ammonia. It burns with a bright flame, acts feebly as an acid, but reddens litmus paper, the blue colour of which returns as the acid evaporates. It is extremely volatile, and when a drop on paper is exposed to the air, the evaporation of a part of it renders the remainder so cold that it solidifies; and this effect is produced even when the temperature of the air is 68°. The specific gravity of its vapour is to atmospheric air as 0·9476 to 1. It combines with water and alcohol in all proportions.

It forms but few salts on account of the facility with which it decomposes, and is very subject to spontaneous decomposition, especially if exposed to light, even when kept in well-stoppered bottles; this is owing to the tendency of its elements to form new combinations. The first indication of decomposition is that the acid becomes of a brown tint, which gradually gets deeper, and eventually ammonia is formed and a black powder subsides. If this is exposed to a red heat water is expelled, and *paracyanogen* remains as a brown powder; so named on account of its being isomeric with cyanogen. When diluted with water, and especially if a little hydrochloric acid be added, the decomposition of hydrocyanic acid is much retarded.

The above-mentioned are the properties of real or anhydrous hydrocyanic acid; that of the Pharmacopœia which contains only two per cent. of it, possesses them of course in a much lower degree.

Composition.—Regarding it as a ternary compound, hydrocyanic acid consists of

Two equivalents of Carbon....	6 × 2 =	12	or	44·4
One ,, of Nitrogen..		14	,,	51·9
One ,, of Hydrogen		1	,,	3·7
Equivalent....		27		100·

It is, however, usually considered as a compound of hydrogen and cyanogen, and as composed of one volume of cyanogen and one of hydrogen, which combine without condensing, forming two volumes of vapour of hydrocyanic acid; thus—

				Grains.
50	cubic inches	of	Cyanogen weigh ...	27·95
50	,,	,,	Hydrogen	1·075
100	,,	,,	vapour of Hydrocyanic Acid weighing	29·025

And this may be regarded as composed of

1 equivalent of Cyanogen	26	or	96·3
1 " Hydrogen	1	"	3·7
Equivalent....	27		100.

Formula........ C^2NH, or CyH.

I shall give the formulæ of all the compounds, which I have have had occasion to describe, at one view:

Ferrocyanide of Potassium	FeCy, 2KCy, 3HO.
Cyanogen	C^2N, or Cy.
Hydrocyanic Acid	CyH.
Yellow Salt	2Fe Cy, KCy.
Paracyanogen	$3C^2N$, or C^6N^3.

Incompatibles.—Nitrate of silver, binoxide of mercury, most metallic salts, alkaline sulphurets, and strychnia. When added to salifiable bases it is in most cases decomposed; so that when mixed with metallic oxides its hydrogen is usually transferred to their oxygen, and the result is not a hydrocyanate of an oxide, but water and a metallic cyanide. The changes which occur correspond to those which happen with hydrochloric acid and bases, as already described.

Tests.—The presence of hydrocyanic acid may be recognised by mixing a little of the suspected liquid with two or three drops of hydrosulphate of ammonia, heating the mixture until it becomes colourless, and adding a drop of sesquichloride of iron, when the characteristic deep red colour of sulphocyanide of iron will be produced if hydrocyanic acid existed in the liquid. Another test proposed is to invert a plate of glass on which a drop of a solution of nitrate of silver has been placed over the suspected liquid, which is then to be gently warmed. If hydrocyanic acid be present the test drop will be covered with a white film of cyanide of silver soluble in nitric acid.

Medicinal Uses.—Hydrocyanic Acid acts as a sedative without possessing the stimulating property of opium. It has been used to allay gastric and pulmonary irritation; in the former, when proceeding from dyspepsia or functional disorder of the stomach, as well as in cancerous affections; and in the latter, to allay cough, and the first symptoms of tubercles in the lungs. Great caution should be observed in its use, and the dose at first should not exceed five or six minims, which may be increased according to the prudence and judgment of the practitioner. It has likewise been employed in convulsions and spasmodic affections, as hooping-cough and asthma, and externally in the form of lotion to allay the violent itching which so frequently accompanies skin diseases.

ACIDUM NITRICUM DILUTUM.

Diluted Nitric Acid.

Acidum Nitrosum Dilutum, P.L. 1788.
Acidum Nitricum Dilutum, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Nitric Acid three fluidounces,
Distilled Water seventeen fluidounces;
Mix.

Its specific gravity is 1·082. A fluidounce of this acid is saturated by 154 grains of the crystals of carbonate of soda.

Remarks.—The Nitric Acid of the late Pharmacopœia being stronger than that of the present, the quantities of acid and water are proportionally altered, the strength of the present diluted acid being to that of the Pharmacopœia of 1836 very nearly as 100 to 94·5, and a difference which is quite unimportant. Nitric acid of the density of 1·082 is composed of

Dry or real Nitric Acid........	12·22
Water......................	87·78
	100·

Impurities and Tests.—See Materia Medica: *Acidum Nitricum.*

Medicinal Use.—This acid is a very powerful antiphlogistic remedy, and is probably serviceable in restraining the progress of syphilis, when an impaired constitution or other circumstances render the exhibition of mercury improper. If sufficiently diluted, it forms an excellent lotion for old indolent ulcers. It is expectorant, and is occasionally used with success in counteracting the consecutive effects of opium. Dose ♏x to ♏xl.

Although the process for preparing Acidum Nitricum is omitted in the present Pharmacopœia, this acid being now transferred to Materia Medica, I shall take this opportunity of inserting it.

ACIDUM NITRICUM, P.L. 1836.

Nitric Acid.

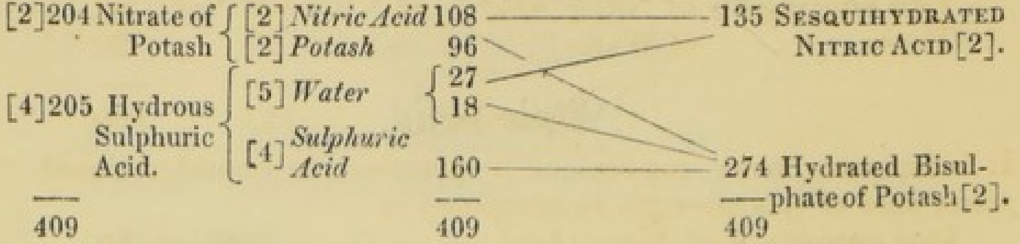
Aqua Fortis Simplex, *Aqua Fortis Duplex*, P.L. 1721.
Spiritus Nitri Glauberi, P.L. 1746.
Acidum Nitrosum, P.L. 1788.
Acidum Nitricum, P.L. 1809, P.L. 1824.

Take of Nitrate of Potash, dried,
Sulphuric Acid, each two pounds;

Mix in a glass retort, then let the Acid distil in a sand-bath.

Remarks.—The nitrate of potash, commonly called *Nitre* or *Saltpetre*, employed in this country, is chiefly imported from India. It is found in many intertropical countries and extracted by washing the soil. The nitriferous soil of Bengal contains on an average seven parts of nitre in 1000. It also occurs in some plants: Tobacco, Cissampelos Pareira, &c.

Process.—Nitric Acid, as I shall more particularly mention, is composed of oxygen and nitrogen. The quantities of nitrate of potash and sulphuric acid above directed to be employed, are nearly in the proportions of one equivalent of the salt to two equivalents of the acid; but in explaining the operation it will be more convenient to consider two equivalents of the nitrate and four equivalents of the sulphuric acid as mixed and submitted to distillation. Two eqs. or 204 parts of nitrate of potash, are composed of two eqs. of *nitric acid* 108, and two eqs. of *potash* 96; four eqs. of hydrous sulphuric acid or 205 parts, consist of five eqs. of *water* 45, and four eqs. of *sulphuric acid* 160. When the salt and acid are mixed and heated, double decomposition ensues: the two eqs. of potash 96 combine with the four eqs. of sulphuric acid 160, and two eqs. of the water 18, and form two eqs. 274 of hydrous bisulphate of potash, which remain in the retort: two eqs. of nitric acid 108 rise in vapour and combine with three eqs. of the water 27, and form two eqs. of HYDROUS NITRIC ACID 135. The annexed diagram will further explain the nature of the operation:



The use of two equivalents of sulphuric acid to decompose one equivalent of nitrate of potash is twofold. First, the quantity of water is just sufficient to condense the nitric acid; and secondly, bisulphate of potash is readily dissolved out of the retort, whereas neutral sulphate is a salt of difficult solubility, and its removal is attended with great risk of the fracture of the retort, which is of much greater value than the extra sulphuric acid. The College have now placed nitric acid in the Materia Medica, and its specific gravity is to be only 1·42 instead of 1·50, as in the late Pharmacopœia; it being quite as easy to distil acid of 1·5 as of 1·42; it is better at any rate to do so on the small scale, and I therefore retain the old process. The nitric acid of 1·5 contains 80 per cent. of real acid, and that of 1·42 only 60 per cent., the former may therefore be reduced to the latter by adding 100 parts of it by weight to 34 of distilled water; this order of mixing should be observed, as considerable heat is evolved. If it be preferred, the proper quantity of water might be mixed with the sulphuric acid, and nitric acid of 1·42 obtained at once.

As the nitric acid obtained in this operation consists of two equivalents of acid combined with three of water, it is evidently a sesquihydrate, or consists of one equivalent of acid combined with one and a half equivalent of water, and this is I believe the strongest procurable by simple distillation. Before I describe its properties I shall state the composition of nitric acid.

Composition.—Anhydrous Nitric Acid, as it exists in nitrate of potash and other anhydrous nitrates, and as it may be prepared in a mode I shall presently mention, consists of

Five equivalents of Oxygen	8 × 5 =	40	or	74
One ,, of Nitrogen....		14	....	26
	Equivalent....	54		100

Formula....... NO^5.

Or it may be considered as composed of

Five volumes of Oxygen Gas.
Two volumes of Nitrogen Gas.

The Nitric Acid prepared by the process above described is, as already noticed, a sesquihydrate consisting of

Two equivalents of Nitric Acid	54×2=108	or	80
Three ,, of Water	9×3= 27	,,	20
Equivalent	135.		100

It is however more convenient in practice, to consider liquid nitric acid of this strength as composed of

One equivalent of Nitric Acid	54·0	or	80
One and a half equivalent of Water	9×1·5=13·5	,,	20
Equivalent	67·5.		100

Formula ...... $2NO^5, 3HO$, or $NO^5, 1\frac{1}{2}HO$.

The Nitric Acid of the Pharmacopœia, of specific gravity 1·42, consists of

One equivalent of Nitric Acid	54	or	60
Four ,, of Water	9×4=36	,,	40
Equivalent	90.		100

Formula...... $NO^5\,4HO$.

Graham regards this Nitric Acid (of sp. gr. 1·42) as a *nitrate of water*, in which one eq. of water is combined with one eq. of nitric acid as *basic* water, whilst the remaining three eqs. of water, termed *constitutional water*, unite with the nitrate of water. Under this view its formula would be written $NO^5, HO, +3HO$.

Nitric Acid of sp. gr. 1·5033 to 1·504 is the strongest procurable by simple distillation; it has, however, been shown by Mr. Arthur Smith (Mem. Chem. Soc. vol. iii. p. 399), that when cold air is drawn through this acid, it loses half an eq. of water; acquires a sp. gr. of 1·517 at 60°, is perfectly limpid and colourless, boils at 184°, and even if boiling exerts not the slightest action on tin or iron; it does not change when subjected to a freezing mixture of salt and snow. It consists of

One equivalent of Nitric Acid	54	or	85·71
One ,, of Water	9	,,	14·29
Equivalent	63.		100·

Formula...... NO^5, HO.

Anhydrous Nitric Acid was obtained by M. Deville (Chem. Gaz. vol. vii. p. 129), by treating nitrate of silver with dry chlorine; it is solid, and affords perfectly transparent crystals of great brilliancy, the form of which is a six-sided prism; it melts at a little above 85°, and boils at about 113°; when brought into contact with water it evolves much heat, and dissolves without the disengagement of any gas, or the production of colour. When heated nearly to its boiling-point decomposition begins. By analysis it yielded

Five equivalents of Oxygen	8×5=40	or	74·07
One „ of Nitrogen	14	„	25·93
Equivalent......	54.		100·

Formula...... NO^5.

Oxygen and Nitrogen unite in *five* different proportions, forming the following definite compounds:—

			Formulæ.
1 Equivalent of Nitrogen 1 „ Oxygen	form	Nitrous Oxide Gas ..	NO.
1 Equivalent of Nitrogen 2 „ Oxygen	„	Nitric Oxide Gas....	NO^2.
1 Equivalent of Nitrogen 3 „ Oxygen	„	Hyponitrous Acid	NO^3.
1 Equivalent of Nitrogen 4 „ Oxygen	„	Nitrous Acid	NO^4.
1 Equivalent of Nitrogen 5 „ Oxygen	„	Nitric Acid	NO^5.

and lately Barreswil has endeavoured to show that Pernitric Acid exists, consisting of one eq. of nitrogen and seven eqs. of oxygen, its formula being NO^7.

Neither the anhydrous nor monohydrated nitric acid has yet been applied to any use.

Properties of the Sesquihydrated Nitric Acid.—Liquid Nitric Acid, usually called merely nitric acid, is a dense fluid, and colourless when quite free from nitrous acid; it emits white disagreeable fumes; its taste is extremely sour and acrid, and the skin is corroded and indelibly tinged of a yellow colour by it. When exposed to the air it attracts water, for which it has considerable affinity; when suddenly mixed with water, heat is evolved. It reddens litmus paper strongly. Its specific gravity varies from 1·5033 to 1·504. It congeals at −40°. When it is mixed with snow, the latter is suddenly liquified, producing intense cold.

Nitric Acid has usually a yellowish tint, owing to the presence of a small but unimportant quantity of nitrous acid formed by the partial decomposition of a little of the nitric acid during its preparation. If the coloured nitric acid be moderately heated in a retort, it is rendered colourless, nitric oxide being expelled. By exposure to light, and especially to the direct rays of the sun, nitric acid becomes first of a straw, and then of a deep orange colour; this change is owing to the evolution of oxygen, and the consequent formation of nitrous acid. If concentrated, it does not act upon the metals in general at ordinary temperatures, nor on some of them even when boiled in it; but when a little water is added, most of them decompose a portion of the acid, and of the water also; and the metals combining with the oxygen of both, are either oxidized and become insoluble, or are dissolved and converted into nitrates by the nitric acid remaining undecomposed; during this action *nitric oxide gas* (nitrous gas) is given out, which uniting with the oxygen of the air, forms red fumes of *nitrous acid gas*. Nitric acid is decomposed by some combustible bodies with great rapidity, as by charcoal, phosphorus, and sugar, but it has no action upon platinum nor gold, and they, of course, do not decompose it. When mixed with hydrochloric acid, both acids suffer decomposition. The mixture is called *Aqua-regia*, or nitro-hydrochloric acid; it possesses the power of dissolving both platinum and gold. According to Gay-Lussac, aqua-regia under the influence of heat, without the agency of any other body, is decomposed into *chloronitric vapour*, chlorine and water, the chlorine alone being retained by the gold, whilst the chloronitric vapour, to which the action of aqua-regia upon gold has been attributed, passes off as if no gold were present. Nitric acid is incompatible with sulphate of iron, the protoxide of which decomposes it, and combining with its oxygen, becomes sesquioxide, whilst the colour of the solution of iron changes from bluish green to yellowish red. It acts strongly upon spirit of wine, and by their mutual decomposition hyponitrous ether is formed (*Spiritus Ætheris Nitrici*).

Impurities and Tests.—The presence of nitric acid may be recognized by adding pure sulphuric acid to the concentrated liquid suspected to contain it, together with some concentrated solution of protosulphate of iron. The smallest trace of nitric acid affords, when the mixture is warmed, a pink-red colour of greater or less intensity, and if it occurs in considerable quantity, the liquid will become almost black. See MATERIA MEDICA; *Acidum Nitricum.*

Incompatibles.—Oxides, earths, alkalis, and their carbonates, are incompatible with this acid, and sulphurets are decomposed by it. It decomposes the solution of acetate of lead, and of acetate of potash, expelling the acetic acid, and forming nitrate of lead and nitrate of potash.

Pharmacopœia Preparations.—Acidum Nitricum Dilutum, Bismuthi Nitras, Spiritus Ætheris Nitrici, Unguentum Hydrargyri Nitratis.

Pharmacopœia Uses.—Acidum Phosphoricum Dilutum, Ferri Potassio-tartras, Hydrargyri Nitrico-oxydum.

Medicinal Uses.—It is sometimes employed externally as an escharotic. See ACIDUM NITRICUM DILUTUM.

ACIDUM PHOSPHORICUM DILUTUM.

Diluted Phosphoric Acid.

Acidum Phosphoricum Dilutum, P.L. 1836.

Take of Phosphorus six drachms,
Nitric Acid four fluidounces,
Distilled Water eight fluidounces.

The Acid being mixed with the Water, add the Phosphorus to it in a retort placed in a sand-bath; then apply heat until six fluidounces have distilled. These are afterwards to be returned to the retort, that six fluidounces may again distil, which are to be rejected. Evaporate the residual solution in a capsule made of platinum, until of the whole but two ounces remain. Lastly, to the Acid, when it has cooled, add as much distilled water as may be sufficient to accurately fill a pint measure, and mix.

Free from colour and smell. Its specific gravity is 1·064. Chloride of barium, or nitrate of silver being added, nothing is thrown down. It has no influence upon strips of copper or silver, nor is it coloured, before or afterwards, on hydrosulphuric acid being poured in. A fluidounce of this acid is saturated by 132 grains of crystals of carbonate of soda, and nothing is precipitated from it.

Remarks.—The absence of sulphuric acid or of a sulphate is proved by there being no precipitate yielded by chloride of barium which is insoluble in nitric acid; that no hydrochloric acid nor any chloride is held in solution, is proved by nitrate of silver giving no precipitate which is insoluble in nitric acid. When carbonate of soda gives no precipitate, no phosphate of lime, nor other phosphate insoluble in water, is dissolved by the phosphoric acid.

Phosphorus, either free, or in combination with other elements, is found in the animal, vegetable, and mineral kingdoms, and in all three, chiefly exists as phosphate of lime. It is an elementary body, and was discovered by Brandt of Hamburg in the year 1669.

Preparation.—Phosphorus was first obtained from urine. It is now procured from *bone-ash* (phosphate of lime) by treating it with diluted sulphuric acid; this decomposes the phosphate of lime, producing sulphate of lime, which salt being but slightly soluble, is separated and rejected, and superphosphate of lime which remains in solution; this latter, after evaporation to the consistence of a syrup, is mixed with powdered charcoal, and the dried mixture distilled in a glazed earthen retort.

The phosphoric acid, which is a compound of phosphorus and oxygen, is decomposed by the action of heat; carbonic oxide and acid gases are formed by the union of the oxygen of the phosphoric acid with the charcoal, whilst the phosphorus is set free and rises in vapour, which is condensed in cold water. It is afterwards melted, strained through leather, and cast into sticks for sale.

Properties.—Phosphorus is solid, colourless, or tinged with yellow or flesh colour when first prepared; it is transparent when slowly solidified, but when quickly cooled it has a waxy lustre; its surface becomes opaque by keeping. Its specific gravity is 1·896 (Playfair and Joule 1·800). At common temperatures it can be indented by the nail and cut with a knife, possessing much the same hardness as wax. From its solution in sulphuret of carbon, it may be crystallized in octohedrons, it also occurs in rhombic dodecahedrons; it is insoluble in water, but soluble in the fixed and volatile oils, and also in ether. Phosphorus is inodorous, but its vapour has a most disagreeable alliaceous odour, and in solution its taste is sharp and nauseous; it is flexible at common temperatures, but brittle and crystalline at 32°; at 110° phosphorus fuses, forming an oil-like liquid; at 574° it boils, yielding a colourless vapour, the density of which is 4·355. Phosphorus is very inflammable, and has been known to ignite spontaneously in the air at 60°; it sometimes takes fire even by the friction attending the cutting of it; it should be handled with care, as the heat of the hand is sufficient to produce the same effect, and burns from phosphorus are very painful. When the temperature of the air is not so high as to occasion ignition, it undergoes slow combustion, emitting a vapour which is luminous in the dark, and which by absorbing oxygen is converted into a mixture of phosphorous and phosphoric acids. Schönbein states that phosphorus never becomes luminous if the production of *ozone* be prevented, and that the luminosity of phosphorus is extinguished if the ozone be removed. The luminous vapour called *Jack-o-lantern* is thought to consist of phosphorus in combination with hydrogen. According to Faraday, phosphorus, whether in the solid or liquid state, is a non-conductor of electricity. It should always be kept in a stoppered vessel filled with water, and protected from the light.

The red substance formed by the action of light on the surface of the phosphorus above described, is an allotropic condition of phosphorus, differing widely from the usual variety in many of its physical and chemical properties. Common phosphorus is converted into *red phosphorus*, by keeping it at a temperature of about 480° for many hours, or even for days; it then becomes a reddish brown mass, very brittle, and harder than calcareous spar. It is unalterable in the air, insoluble in sulphuret of carbon, ether, naphtha, oil of turpentine, &c. It is amorphous, and does not ignite in the air until exposed to about 500°, at which temperature, if heated in an inert gas, it returns to the state of common phosphorus*.

The Equivalent of Phosphorus is 32.

Symbol or *Formula* . . . . . . P.

Phosphorus combines with most elementary bodies. For the description of these compounds I must refer to chemical writers. It is stated to form four compounds with oxygen. Of these, one, the oxide of phosphorus P^2O of Le Verrier, is most probably the *red phosphorus* above described, and in this case the oxygen compounds of this substance are but three, viz.—

	Formulæ.
Hypophosphorous Acid	PO
Phosphorous Acid	PO^3
Phosphoric Acid	PO^5

Of these, the only one introduced into the Pharmacopœia is the last.

Process.—Nitric acid, as already has been stated, is composed of 5 eqs. of oxygen 40, and 1 eq. of nitrogen 14=54, but it may be regarded as consisting, secondarily, of 3 eqs. of oxygen 24, and 1 eq. of *nitric oxide* 30=54. Now many substances, especially the metals, when treated with nitric acid, decompose it, not into oxygen and nitrogen, but into oxygen, with which the metal combines, and nitric oxide, which is evolved in the form of gas. Phosphorus acts similarly on nitric acid, and when the acid is of the greatest strength the action is so intense as to cause the ignition of the phosphorus with explosion. When however diluted nitric acid is employed, as directed in the Pharmacopœia, the action is comparatively slow.

A portion of the diluted nitric acid distils before the whole of the phosphorus is acidified, and hence the necessity of returning the first distillate to the retort, as ordered.

The reaction which takes place is explained by the following statement.

Five eqs. of nitric acid=270, act upon three eqs. of phosphorus=96, which decompose the nitric acid into five eqs. of nitric oxide=150, evolved in the gaseous form; whilst fifteen eqs. of oxygen=120, combine with three eqs. of phosphorus=96, and form 216=three eqs. of PHOSPHORIC ACID.

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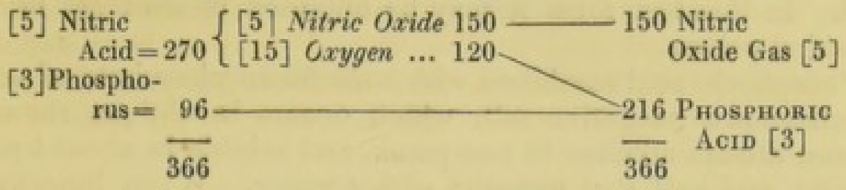
* Another allotropic condition of phosphorus is said to exist. Phosphorus dissolved by sulphuret of carbon, when in this state, retains the liquid form after the evaporation of the solvent, and neither long keeping, boiling, nor exposure to freezing mixtures, causes it to resume its common and usual condition.—Ed.

I subjoin a diagram of these changes.



Composition.—Phosphoric Acid is composed of

Five equivalents of Oxygen	$8 \times 5 = 40$ or	55·5
One „ of Phosphorus	32 „	44·5
Equivalent	72.	100·

Formula...... PO^5.

By evaporating the solution thus obtained to a syrup by a moderate heat, the residue consists of one eq. of phosphoric acid combined with three eqs. of water, and is termed *tribasic*, *paraphosphoric*, or *terhydrate of phosphoric acid*, PO^5, 3HO, which, when neutralized by solution of ammonia, gives a pale yellow precipitate with nitrate of silver. When this syrupy acid is still further heated to 417° for a considerable length of time, it loses one eq. of water, and becomes *bibasic*, *pyrophosphoric*, or *deutohydrate of phosphoric acid*; its formula being PO^5, 2HO. This is a viscid syrup, very acid, and very soluble in water; when neutralized by ammonia its solution gives a flaky white precipitate with nitrate of silver. If this syrup be heated to redness in a platinum crucible it suffers a further change, loses another eq. of water, and is converted into *monobasic*, *metaphosphoric*, *glacial*, or *monohydrate of phosphoric acid*, so that it consists of PO^5, HO. This is a colourless transparent glass, which slowly dissolves in water, the solution precipitating nitrate of silver as a white granular powder, and coagulating albumen, which is not the case with pyrophosphoric acid. Solutions of both these latter acids and their salts pass into the first, or tribasic acid, if rapidly boiled, or kept for a long time at common temperatures. When phosphoric acid has once been brought into contact with water, heat will not render it anhydrous. Anhydrous phosphoric acid is procured by burning phosphorus in a current of dry atmospheric air.

Properties.—The solution of phosphoric acid obtained by the Pharmacopœia process is a colourless, inodorous, sour liquid, reddening litmus paper strongly, and evincing powerful acid properties by the permanent saline compounds which it forms with the alkalis, earths, and metallic oxides. It consists of

Phosphoric Acid	8·7
Water............................	91·3
	100·

Before dilution the phosphoric acid appears to be a mixture of pyrophosphoric and metaphosphoric acids, but the solution, as already remarked, soon changes into the common or tribasic acid. In this last form it may be obtained in the form of flat six-sided prisms.

Phosphoric acid combined with soda forms phosphate of soda, a well-known purgative salt, which occurs in oblique rhombic prisms, always alkaline to test-paper, and soluble in about 4 parts of cold, and half that quantity of hot water. When lime-water is added to phosphoric acid an insoluble phosphate of lime is precipitated. The phosphates of barytes, strontia, lead, &c. are insoluble in water, but differ from the sulphates of these bases in being soluble in dilute nitric acid. The phosphates give a yellow precipitate with nitrate of silver, which is phosphate of silver; but if the phosphate of soda be heated to redness before it is dissolved in water, it gives a white precipitate with nitrate of silver, which is pyrophosphate of silver.

Incompatibles.—Alkalis, earths, some metals, and metallic oxides, and such other substances and salts as are incompatible with acids in general.

Medicinal Uses.—Phosphoric Acid possesses the tonic properties of Sulphuric Acid, and is preferable to it in point of flavour. It has also been used with advantage to correct those morbid states of the system in which a tendency exists to unusual depositions of phosphate of lime, such as in cases of exostosis, or formation of bony tumors, as well as in some forms of urinary concretion. It may be employed for a longer period without disturbing the digestive functions than most agents of this class.

Dr. Paris (Appendix to the Pharmacologia) states, that he has found it to assuage the thirst so commonly present in diabetes, more effectually than any other acidulated drink. Dose ♏xx to f℥j.

ACIDUM SULPHURICUM DILUTUM.

Diluted Sulphuric Acid.

Spiritus Vitrioli Tenuis, P.L. 1746.
Acidum Vitriolicum Dilutum, P.L. 1788.
Acidum Sulphuricum Dilutum, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Sulphuric Acid fifteen fluidrachms,
Distilled Water a pint,

Gradually add the Acid to half a pint of the water, afterwards pour in as much of the remaining water as may be sufficient to exactly fill a pint measure, and mix.

Its specific gravity is 1·103. A fluidounce of this acid is saturated by 216 grains of crystals of carbonate of soda.

Remarks.—A fluidounce of this acid contains exactly 60 grs. (a drachm) of anhydrous sulphuric acid, and weighs 482·5 grains. It consists of

Anhydrous Sulphuric Acid	12·43
Water	87·57
	100·

It is rather weaker than the Acidum Sulphuricum Dilutum of the last Pharmacopœia.

In Germany sulphuric acid used to be prepared by distilling dried *copperas*, crude sulphate of iron, and the product was called "*Nordhausen* Oil of vitriol," from the place of manufacture. This is a dark brown liquid, its specific gravity being about 1·89; it emits white fumes of anhydrous sulphuric acid. Mitscherlich says it yields crystals, containing 1 eq. of water to 2 eqs. of acid.

From this Nordhausen acid, anhydrous sulphuric acid is procured by re-distillation, which separates it into hydrous sulphuric acid, which remains in the retort, and the anhydrous acid, which being more volatile is first vaporized and then condenses in the cooled receiver as a solid, colourless, crystalline mass. At a temperature of above 66° it melts; when dropped into water, for which it has great affinity, combination takes place, accompanied by a hissing noise, and the evolution of intense heat. Anhydrous sulphuric acid may also be obtained by the agency of anhydrous phosphoric acid upon common, or liquid sulphuric acid.

Anhydrous Sulphuric Acid is composed of

One equivalent of Sulphur	16	or 40
Three „ of Oxygen	8×3=24	„ 60
Equivalent	40.	100

Formula ...... SO^3.

The acid remaining undistilled in the retort contains all the water, and therefore consists of

One equivalent of Sulphuric Acid	40	or 81·6
One „ of Water	9	„ 18·4
Equivalent	49.	100·

Formula ...... SO^3, HO.

This is the Acidum Sulphuricum of the Pharmacopœia, commonly called *Oil of Vitriol.* It is however usually prepared by burning sulphur and passing the gas thus produced into leaden chambers together with nitrous gas and moisture, by the agency of which sulphurous gas is converted into sulphuric acid. For details of this process I refer the reader to chemical authors. Iron pyrites and hydrosulphuric acid gas have been occasionally substituted for the crude sulphur.

Properties of Liquid Sulphuric Acid.—This acid is colourless, transparent, inodorous, not volatile at ordinary temperatures, and of an oily consistence: it is highly acrid and corrosive; its acid reaction is extremely strong, so that a single drop gives to a large quantity of water the power of reddening vegetable blue colours; but when undiluted it has the property of turning vegetable yellow colours brown, as the alkalis do, but the brown colour is removed by water. Its boiling-point is about 545°*, and it solidifies at 15° below zero.

The specific gravity of sulphuric acid at 62° of Fahrenheit is to that of water nearly as 1·845 to 1·000; if it exceed this, its purity may be questioned; generally however it is only about 1·8433, and then it is constituted very nearly of

Four eqs. of Anhydrous Acid. .	160	or 1 eq. 40	or	78
Five eqs. of Water	45	,, 1¼eq. 11¼	,,	22
	205.	Equiv. 51¼		100

My observations in some cases apply to acid of this strength.

Sulphuric acid has great affinity for water. By exposure to the air in an open vessel it imbibes one-third of its weight in 24 hours, and more than six times its weight in a twelvemonth. When one part of water is suddenly mixed with four times its weight of concentrated sulphuric acid, both at the temperature of 50°, it is raised to 300°; but according to Dr. Ure, the greatest heat is excited by mixing 73 parts of acid with 27 of water; these are nearly in the proportion of one eq. of liquid acid to two eqs. of water; mixtures of sulphuric acid and water occupy less space than before combination.

Concentrated sulphuric acid acts very slowly upon the metals at ordinary temperatures; but at a boiling heat many of them decompose it, and are oxidized by combining with a portion of its oxygen, while sulphurous acid is given out in the gaseous state. When diluted, it rapidly dissolves those metals which decompose water by its agency, as iron and zinc, with the evolution of hydrogen gas, and it dissolves the oxides of most other metals. It readily combines with the alkalis and earths, and forms with them various important salts.

Most vegetable and animal substances are decomposed by and decompose sulphuric acid, rendering the acid of a dark colour. Although sulphuric acid ought to be colourless, yet the brown tint which it often acquires from the circumstance just mentioned, does not, necessarily, indicate any material deterioration of quality or reduction of strength.

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* There exists great discrepancy amongst chemical authors respecting the boiling-point of liquid sulphuric acid. Phillips has placed it at 545°, as left in the text; Sir H. Davy at 550°; Ure and Christison at "about 600°;" Dalton, Brande, Graham, Turner, and Pereira at 620°; Gregory and Berzelius at about 617°; whilst —15°, —29°, —31°, and —36°, &c. have been assigned as the temperatures at which it congeals.—Ed.

Sulphuric acid acts upon alcohol; and the nature of the product depends upon the relative proportions employed. If equal weights of the acid and rectified spirit be heated in a retort, the product is sulphuric ether; when two of acid and one of spirit are used, ethereal oil is obtained; and when the proportions are seven of acid to one of spirit, olefiant gas is plentifully formed.

Sulphuric Acid forms four definite hydrates, of which the following table gives the composition and formulæ:—

Dihydrate ..	Sulphuric Acid	2 eqs.. .	80	$2SO^3, HO.$
	Water	1 eq. ..	9	
	Equivalent.		89.	
Monohydrate (sp. gr. 1·845)	Sulphuric Acid	1 eq. ..	40	$SO^3, HO.$
	Water	1 eq. ..	9	
	Equivalent.		49.	
Deutohydrate (sp. gr. 1·78)	Sulphuric Acid	1 eq...	40	$SO^3, 2HO.$
	Water	2 eqs.. .	18	
	Equivalent.		58.	
Terhydrate (sp. gr. 1·632)	Sulphuric Acid	1 eq. ..	40	$SO^3, 3HO.$
	Water	3 eqs...	27	
	Equivalent.		67.	

Impurities and Tests.—See MATERIA MEDICA: *Acidum Sulphuricum.*

Pharmacopœia Preparations.—Acidum Sulphuricum Dilutum, Ferri Sulphas.

Pharmacopœia Uses.—Acidum Hydrocyanicum Dilutum, Oleum Æthereum, Antimonii Potassio-tartras, Ferri Potassio-tartras, Hydrargyri Chloridum, Hydrargyri Bichloridum.

Pharmacopœia Preparation, containing *Acidum Sulphuricum Dilutum,* Infusum Rosæ Compositum.

Pharmacopœia Use of *Acidum Sulphuricum Dilutum,* Antimonii Oxysulphuretum.

Incompatibles.—All substances that combine with, or are acted upon, by this acid, are of course incompatible with it; such, as already mentioned, are most of the metals, their oxides, the earths, their carbonates, and the alkaline carbonates. Solutions of acetate of lead and of chloride of calcium are decomposed by it, white precipitates of sulphate of lead and sulphate of lime being obtained. Its presence is detected by the action of barytic salts, with the base of which it forms sulphate of barytes, soluble only in concentrated sulphuric acid.

Adulterations.—Sulphuric acid always contains sulphate of lead, derived from the chambers in which it is manufactured, and sometimes sulphate of potash: these impurities generally amount to about 1-4th of a grain per cent. When water is added to the acid, the sulphate of lead is precipitated in the state of a white insoluble powder, from which the diluted acid should be poured off for use. If sulphate of potash should be fraudulently mixed with the acid, for the purpose of increasing its specific gravity, the best method of detecting it is to saturate the acid with ammonia, and expel the sulphate of ammonia formed, by putting it into a crucible and subjecting it to a red heat; the sulphate of potash will remain in the crucible. It may also contain hydrochloric acid, nitrous or nitric acid, arsenious acid, selenium, lime, magnesia, and the oxides of zinc, tin, iron and copper.

Medicinal Uses.—It possesses the refrigerant and antiseptic virtues common to other acids; and it has astringent properties that render it a most valuable medicine in weakness and relaxation of the digestive organs, in colliquative sweats and in internal hæmorrhage. Dose ♏x to ♏xl.

Comparative saturating power of the Diluted Acids.

One fluidounce of each of the under-mentioned diluted acids saturates the annexed quantity of crystallized Carbonate of Soda:

Acidum Hydrochloricum Dilutum	168 grains.
Acidum Nitricum Dilutum	154 „
Acidum Phosphoricum Dilutum	132 „
Acidum Sulphuricum Dilutum	216 „

ÆTHEREA.

PREPARATIONS OF ETHER.

CHLOROFORMYL.

Chloroform.

Take of Chlorinated Lime, four pounds,
Rectified Spirit, half a pint,
Water, ten pints,
Chloride of Calcium, broken into fragments, a drachm;

Put the lime, previously mixed with the Water, into a retort, and to these add the Spirit, so that the mixture shall fill as much as one-third part of the retort. Then heat in a sand-bath, and when ebullition first begins, immediately withdraw the fire, lest the retort should be broken by the suddenly increased heat. The liquid may distil into the receiver so long as nothing separates from it; the fire being restored, if it should be required, at any time. To the distilled liquid add four times as much of water, and shake all well together. Carefully separate the heavier portion which shall subside, and to it add the Chloride, and frequently agitate for an hour. Lastly, again distil the liquid from a glass retort into a glass receiver.

Free from colour, pleasant in smell; its specific gravity is not less than 1·48. It is barely entirely dissolved by water; it does not turn the colour of litmus red; when rubbed upon the skin it soon evaporates, scarcely any smell being left.

Remarks.—Its specific gravity not being less than 1·48, shows that it is not adulterated with ether, nor rectified spirit. Its not reddening litmus, proves that no free acid is present, whilst its freedom from unpleasant smell indicates the absence of free chlorine, hypochlorous acid, aldehyde, &c. Chloroform, or *Perchloride of Formyl*, is now for the first time inserted in the Pharmacopœia. This compound may also be procured by distilling *Chloral* with milk of lime; the former being a substance in which three eqs. of chlorine have replaced three eqs. of the hydrogen contained in aldehyde. (See ACETUM DESTILLATUM.)

Aldehyde $C^4\ H^3\ O + HO$ becoming, when converted into
Chloral $C^4\ Cl^3\ O + HO$;

or by distilling *Acetone, Pyroxylic Spirit*, or Rectified Spirit as above directed, with chlorinated lime and water. By the action of chlorine upon alcohol a product is obtained which formerly was called *heavy muriatic ether*, the term *chloral* being given to it by Dumas and Liebig. From this liquid, Soubeiran, and afterwards Liebig, by distilling it with milk of lime or solution of potash, obtained *Chloroform*. Since then the readier and inexpensive method of procuring it detailed in the text has been discovered. The term Chloroform is derived from Chlorine, and the hypothetical base *Formyl*, which name has been bestowed on the hydrocarbon $C^2\ H$, its presumed oxide being *Formic acid*.

This acid was discovered in the red ant (*Formica rufa*), and from these insects it was first prepared. Since then it has been observed that when the vapour of pyroxylic spirit is brought into contact with finely-divided platinum, a product results precisely resembling formic acid in its properties and constitution; this acid has also been prepared by various other methods, for which I refer to chemical authors.

The difference of composition between formic acid and chloroform, will at once be perceived by comparing the subjoined formulæ, in which the three equivalents of *oxygen* existing in formic acid are exchanged for three equivalents of *chlorine* which occur in chloroform:—

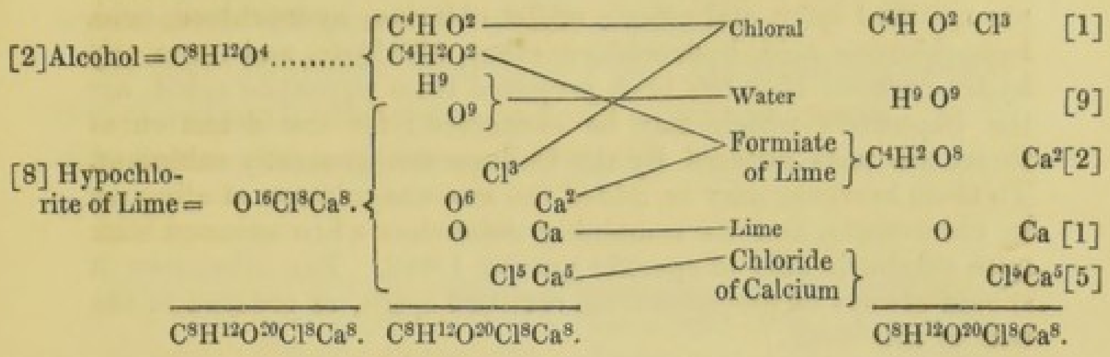
Formic Acid.... $C^2 H O^3$.
Chloroform .... $C^2 H Cl^3$.

Various opinions have been, and still are, entertained respecting the nature of the compound chlorine forms, when it is absorbed by *slaked lime*, and objections of weight may be urged against every theory of the constitution of this substance which has hitherto been published. Chemists however are now generally disposed to consider this compound, commonly called *chloride of lime*, or *bleaching powder*, as essentially consisting of *hypochlorite of lime* and chloride of calcium, along with water and excess of lime. I shall adopt this view of its nature in explaining its action in the production of chloroform.

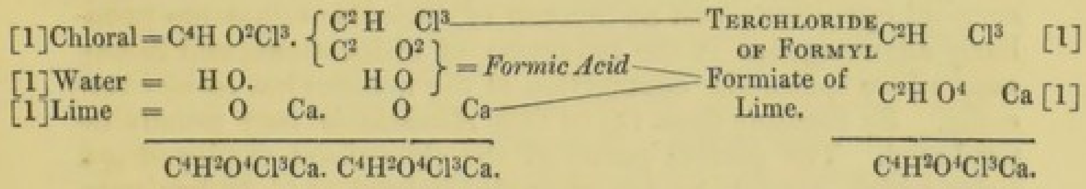
In considering the formation of chloroform from rectified spirit and chlorinated lime, we may then regard the latter as being simply hypochlorite of lime, that being the only one of its constituents in any way concerned in the process; although it is requisite that, as is invariably the case with the bleaching-powder of commerce, excess of lime should be present, in order to convert the formiate of lime into carbonate of lime, and to ensure the production of chloroform.

Process.—When two eqs. of alcohol $C^8 H^{12} O^4$ are brought into contact with eight eqs. of hypochlorite of lime $Ca^8 O^8 + Cl^8 O^8$, and these are diluted with water and exposed to heat, there are formed, one eq. of *Chloral* $C^4HCl^3O^2$, five eqs. of *Chloride of Calcium* $Ca^5 Cl^5$, two eqs. of *Formiate of Lime* $Ca^2 O^2 + C^4 H^2 O^6$, one eq. of *Lime* CaO, and nine eqs. of *Water* $H^9 O^9$: by the further mutual action of the one eq. of *Lime*, the one eq. of *Water*, and the one eq. of *Chloral*, a rearrangement of the constituents of these compounds takes place, resulting in the formation of one eq. of CHLOROFORM, or TERCHLORIDE OF FORMYL, $C^2 H Cl^3$, which distils, and one eq. of *Formiate of Lime* $CaO + C^2 H O^3$. This last, with the two former equivalents of formiate of lime, is converted by the action of excess of lime and its hypochlorite, into six eqs. of carbonate of lime, which combine with the chloride of calcium, forming a brilliant arenaceous powder.

The subjoined diagrams may further elucidate these complex reactions:—



The chloral, lime, and one eq. of the water are again decomposed:—



Chloroform, or Terchloride of Formyl, thus prepared is composed of

Two equivalents	of Carbon	6 × 2 =	12	or	9·92
One ,,	of Hydrogen		1	,,	·66
Three ,,	of Chlorine	36 × 3 =	108	,,	89·42
	Equivalent		121		100·

Formula...... $C^2\ H\ Cl^3$.

Properties.—It is a transparent, colourless, oleaginous-looking liquid, possessing a specific gravity of 1·48 to 1·5, very volatile, and when pure, of a cool sweet taste, and fragrant ethereal smell. It is very slightly soluble in water, but dissolves in alcohol and ether; it readily dissolves camphor, caoutchouc, amber, copal, and the gum-resins; it is also a solvent for iodine and bromine, both of which it will withdraw from their aqueous solutions; it is also stated to dissolve wax, phosphorus, and sulphur. It boils at 141°; it is but slightly inflammable, although it will burn, producing a greenish-coloured flame when ignited. Sulphuric acid has no immediate action on chloroform, but this acid appears to impart to this substance a tendency to decomposition. Nitric acid slowly decomposes it, but nitrate of silver exerts no action upon it, more than imparting a cloudiness, similar to that produced in it when not quite free from alcohol by dropping it into water. Potassium excites but slight action upon chloroform, nor do the caustic alkalis decompose it, unless by long-continued ebullition, when they are converted into their respective chlorides and formiates.

Adulterations, Impurities, and Tests.—The ordinary adulterants are rectified spirit and ether; whilst chlorine, hydrochloric acid, hypochlorous acid, hydrochloric ether, aldehyde, and some oily hydro-carbons if it has been prepared from pyroxylic spirit, are the impurities which may be suspected; for the detection of these, the tests ordered by the College are generally sufficient. To them however may be added the non-coagulation of albumen by chloroform, and its remaining colourless when agitated with pure sulphuric acid of specific gravity 1·842. For inhalation it should always be prepared from rectified spirit, as ordered in the text of this work.

Medicinal Uses.—Chloroform is extensively and usefully employed as the most effectual and least dangerous of the anæsthetic agents hitherto discovered; producing insensibility to pain during surgical operations, and an amount of muscular relaxation peculiarly advantageous in the reduction of dislocations, and in any case where spasmodic contraction of the muscles has to be overcome. By inhaling from f℥j to f℥ij, *Anæsthesia* may usually be produced. The perfect purity of the chloroform employed is a point which cannot be too strongly insisted on. It has been given internally in cases of obstinate vomiting, asthma, and hysteria in doses of ♏v to ♏xxx, dissolved in mucilage by the addition of rectified spirit. It has also been used as a liniment in neuralgic affections.

OLEUM ÆTHEREUM.

Ethereal Oil.

Oleum Vini, P.L. 1788.
Oleum Æthereum, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Rectified Spirit two pints,
Sulphuric Acid thirty-six fluidounces,
Solution of Potash,
Distilled Water, of each a fluidounce, or as much as may be sufficient;

Mix the Acid cautiously with the Spirit. Let the liquor distil until a black froth arises; then immediately remove the retort from the fire. Separate the lighter supernatant liquor, and expose to the air for a day. Add to it the Solution of Potash first mixed with the water, and shake the whole together. Lastly, when sufficiently washed, separate the Ethereal Oil which subsides.

Of this the specific gravity is 1·05. Dropped into water it sinks directly, the globular form being preserved. It is dissolved in ether; it does not change the colour of litmus to red.

Remarks.—When ethereal oil possesses the specific gravity of 1·05, it is the product directed to be employed in the preparation of *Spiritus Ætheris Compositus.* Sinking in water, and preserving the globular form of the drops, evidences its freedom from any considerable quantity of ether and rectified spirit, and its inertness on litmus, the absence of sulphurous or sulphuric acids.

Process.—The proportions of rectified spirit and sulphuric acid directed to be employed are scarcely altered from the last Pharmacopœia, measure being the mode of estimation now adopted, instead of weight; two pints of rectified spirit weighing about 30½oz. and 36 fluidounces of sulphuric acid about 60½ oz., or 2 to 1 as directed in the former process, so that neither the former, nor the present differs materially from that employed by Hennell and Serullas. The products of the distillation are ether, water, sulphurous acid, and a yellow oily fluid which floats upon the water. The sulphurous acid results from the mutual decomposition of a portion of the sulphuric acid and alcohol, the black froth being carbon separated from the spirit. The yellow oily fluid on exposure to the air loses, by evaporation, the ether with which it is mixed, and the residue after the action of the potash to separate the sulphurous acid, is ethereal oil.

Composition.—*Oil of Wine*, or *Heavy Oil of Wine*, has since been described under the names of *Sulphatic Ether*, and *Sulphate of Oxide of Ether.* Ethereal oil is by no means constant in its composition. The specific gravity of heavy oil of wine is about 1·133; it is a thin oil of a yellow or greenish colour, very slightly soluble in water, but when boiled either with water or an alkaline solution, *Sulphovinic Acid* is formed, and *Light Oil of Wine* set free. By standing for some time, light oil of wine generally separates into a pale, yellow, and thick oil, *Etherol*, of specific gravity 0·921, which boils at 500°, and solidifies at 31° below zero, and a crystallized, brittle and tasteless substance, termed *Etherine*, of specific gravity 0·980, which melts at 230°, and boils at 464°. These two bodies are considered as isomeric in constitution. The Ethereal Oil of the Pharmacopœia must be regarded as a mixture of the heavy and light oils of wine; for its specific gravity is less than that of the one, and greater than that of the other, and it contains less sulphuric acid than the former, whilst light oil of wine contains none. Etherol and Etherine (Light Oil of Wine) are composed of

Four equivalents of Carbon	$6\times4=24$	or	85·71
Four „ of Hydrogen	$1\times4=\ 4$	„	14·29
	28		100.

Formula. . . . $C^4 H^4$.

Whilst Heavy Oil of Wine, according both to Serullas and Liebig, consists of

Two equivalents of Sulphuric Acid	$40\times2=80$	or	54·88
Eight „ of Carbon	$6\times8=48$	„	33·49
Nine „ of Hydrogen ..	$1\times9=\ 9$	„	6·15
One „ of Oxygen	8	„	5·48
	145		100·

Formula. . . . $C^8 H^9 O, 2SO^3$, or $C^4 H^5 O, 2SO^3 + C^4 H^4$.

Now this contains far more sulphuric acid than ethereal oil does, which, according to the analysis of Hennell, consists of

Sulphuric Acid	38·	or nearly One equivalent........	40
Carbon	53·7	Nine equivalents $6\times9=$	54
Hydrogen	8·3	Nine equivalents $1\times9=$	9
	100·		103

If this analysis be correct, or even nearly so, the Oleum Æthereum of the Pharmacopœia examined by Hennell is doubtless the sulphatic ether of Dumas holding in solution Etherol and Etherine, which latter Hennell found by long keeping crystallized from it. On these grounds, I regard the Ethereal Oil of the Pharmacopœia as composed of one eq. of Heavy Oil of Wine (sulphatic ether), combined with one eq. of Etherol, the liquid, and one eq. of Etherine, the solid constituent of Light Oil of Wine, and consisting of

Two equivalents of Sulphuric Acid	$40\times2=80$	or	39·80
Sixteen „ of Carbon	$6\times16=96$	„	47·77
Seventeen „ of Hydrogen	$1\times17=17$	„	8·45
One „ of Oxygen	8	„	3·98
Equivalent....	201		100·

Formula.—$C^{16} H^{17} O, 2SO^3$, or $C^8 H^9 O, 2SO^3 + 2C^4 H^4$.

Properties.—Ethereal Oil is a yellow fluid, somewhat resembling oil of lavender in appearance; it has a penetrating aromatic odour; its taste is rather sharp and bitter; in water it is insoluble, but is dissolved by ether and by alcohol. Its specific gravity according to Hennell is 1·05; its composition is rather variable; this from Hennell's statement appears to depend upon the different quantities of Etherine which it is apt to contain, and a portion of which by long keeping separates in prismatic crystals. Chloride of barium when added to this oil gives no precipitate, but when they are heated together to dryness, the oil is decomposed and sulphate of barytes is precipitated; the necessity of heat to produce this effect proves, that the sulphuric acid is intimately combined with the other constituents of the oil.

Pharmacopœia Preparation.—Spiritus Ætheris Compositus.

SPIRITUS ÆTHERIS COMPOSITUS.

Compound Spirit of Ether.

Spiritus Ætheris Vitriolici Compositus, P.L. 1788.
Spiritus Ætheris Compositus, P.L. 1809.
Spiritus Ætheris Sulphurici Compositus, P.L. 1809, edit. alt., P.L. 1824, P.L. 1836.

Take of Ether eight fluidounces,
Rectified Spirit sixteen fluidounces,
Ethereal Oil three fluidrachms;
Mix.

Remarks.—This preparation is analogous to the *Liquor anodynus mineralis* of Hoffman. By the admixture of spirit with the ether and ethereal oil, these are rendered miscible with water, and more convenient for exhibition.

Medicinal Uses.—Stimulant, Antispasmodic. Dose f ʒss. to f ʒij. As this is the chief preparation in which Ether is employed, I shall here introduce a sketch of its formation and properties.

The last Pharmacopœia contained the following process for the preparation of Ether, or as it was there termed,

ÆTHER SULPHURICUS, P.L. 1836.

Sulphuric Ether.

Spiritus Vitrioli Dulcis, P.L. 1746.
Æther Vitriolicus, P.L. 1788.
Æther Rectificatus, P.L. 1809, P.L. 1824.

Take of Rectified Spirit three pounds,
Sulphuric Acid two pounds,
Carbonate of Potash, previously ignited, an ounce;

Pour two pounds of the spirit into a glass retort, add the acid to it, and mix. Afterwards place it on sand, and raise the heat so that the liquor may quickly boil, and the Ether pass into a receiving vessel cooled with ice or water. Let the liquor distil until some heavier portion begins to pass over. To the liquor which remains in the retort after the heat has diminished, pour the remainder of the spirit, that ether may distil in like manner.

Mix the distilled liquors, then pour off the supernatant portion, and add to it the Carbonate of Potash, shaking them frequently during an hour. Lastly, let the ether distil from a large retort, and be kept in a stopped vessel.

Process.—The nature of the reaction by which ether is produced, is a subject which has been much discussed, and respecting which some difference of opinion still exists.

Rectified spirit, SPIRIT OF WINE, or rather the alcohol which it contains, and to which its properties are owing, consists of

Four equivalents of Carbon......	6×4=	24	or	52·18
Six „ of Hydrogen ...	1×6=	6	„	13·04
Two „ of Oxygen	8×2=	16	„	34·78
Equivalent......		46.		100·

Formula...... $C^4H^6O^2$.

Ether consists of

Four equivalents of Carbon......	6×4=	24	or	64·87
Five „ of Hydrogen....	1×5=	5	„	13·51
One „ of Oxygen..............		8	„	21·62
Equivalent		37.		100·

Formula...... C^4H^5O.

From the above statements of the composition of these two bodies, it is evident that the difference between alcohol and ether consists in the latter containing one eq. less both of oxygen and of hydrogen=one eq. of water, thus

	Carbon.		Hydrogen.		Oxygen.		
One equivalent of Alcohol consists of	24	+	6	+	16	=	46
One „ of Ether consists of	24	+	5	+	8	=	37
Difference......			1	+	8	=	9

One equivalent of water.

When an equivalent of water, or of each of the elements composing water, is abstracted from one equivalent of alcohol, there remains one equivalent of ether. Fourcroy and Vauquelin supposed that sulphuric acid in its action upon alcohol, eliminated ether by the direct separation of water from the alcohol, on account of the great affinity of sulphuric acid for water; this however is not the case.

According to Mr. Hennell, the action of the sulphuric acid is not direct, but intermediate; he found that when two eqs. of sulphuric acid, and one eq. of alcohol were merely mixed, the acid immediately lost four-sevenths of its power of precipitating oxide of lead, and that this portion underwent great change of properties, being converted into the hydrate of peculiar compound called *Sulphovinic acid*, consisting of

Two equivalents of Sulphuric Acid .. 40×2=	80
One „ of Alcohol	46
One eq. of Sulphovinic Acid......	126

Or what is the same, of

Two equivalents of Sulphuric Acid .. 40×2=	80
Four „ of Carbon .... 6×4=	24
Six „ of Hydrogen ...... 1×6=	6
Two „ of Oxygen .... 8×2=	16
One eq. of Sulphovinic Acid......	126

Now in the process for obtaining ether, this *Sulphovinic Acid* is no sooner formed than it is again decomposed into two eqs. of *sulphuric acid*, one eq. of *water*, and one eq. of *ether*, which distils, thus:

	Sulphuric Acid.		Carbon.		Hydrogen.		Oxygen.		
One equivalent of Sulphovinic Acid=	80	+	24	+	6	+	16	=	126
Remaining in the retort	80			+	1	+	8	=	89
One equivalent of Ether.................									37

which distils.

Or,

[1] 46 Alcohol	[1] *Ether* 37	126	Sulphovinic Acid.	37 ETHER [1]
	[1] *Water* 9			9 Water [1]
[2] 80 Sulphuric Acid.				80 Sulphuric Acid [2]
126				126

Mr. Williamson (Phil. Mag. xxxvii. p. 353.) considers the etherifying process as effected by the continuous transformation of sulphuric acid and alcohol, into sulphovinic acid and water, by half the hydrogen of the former interchanging places with the hydro-carbon of the latter; the sulphovinic acid coming in contact with another equivalent of alcohol is converted into sulphuric acid and ether, and the sulphuric acid thus eliminated comes again into contact with alcohol and again forms sulphovinic acid, this again reacts, and so the process goes on continuously, as is found in practice. By some late excellent experiments made by Graham, the formation of sulphovinic acid does not appear to be a *necessary* step in the formation of ether, this philosopher having obtained ether from a mixture of rectified spirit and sulphuric acid, when sealed up in a strong glass tube and heated from 284° to 352° for an hour, and this without distillation, and without the sensible formation of sulphovinic acid; although in the usual mode of making ether, sulphovinic acid is certainly formed, and plays the principal part in its production.

In the mode in which its constitution has been stated, ether is a mere ternary compound of its elements; it has however been supposed, on excellent grounds, that two of these elements exist as a binary compound, and that this is united with the other element to form ether.

Several theories have been proposed from time to time, founded on this conjecture, but which were respectively open to objections of greater or lesser weight, until Sir Robert Kane propounded a view which satisfactorily explains the various phænomena connected with the compounds of ether, which he regards as the protoxide of *ethereum*, a name he bestowed on the hypothetical radical composed of the 4 eqs. of carbon, and 5 eqs. of the hydrogen actually contained in the ether. Berzelius subsequently promulgated similar views, which were embraced by Liebig, and have been since generally adopted by chemists in preference to those formerly entertained.

To this hypothetical hydro-carbon the term *Ethyl* has been applied, and in accordance with it I shall exhibit the composition of Ethyl, Ether, Alcohol, and Sulphovinic Acid.

Ethyl.		
Four eq. Carbon ..	6×4=	24
Five ,, Hydrogen	1×5=	5
Equivalent....		29

Formula ..... $C^4 H^5$.

Ether.	
One equivalent Ethyl	29
One ,, Oxygen ..	8
Equivalent....	37

Formula ..... $C^4 H^5, O$.

Alcohol.	
One equivalent Ethyl	29
One ,, Oxygen ..	8
One ,, Water....	9
Equivalent....	46

Formula.. $C^4 H^5 O, HO$.

Sulphovinic Acid.	
One equivalent Ethyl	29
One ,, Oxygen ..	8
One ,, Water	9
Two ,, Sulphuric Acid	80
Equivalent....	126

Formula.. $C^4 H^5 O, 2SO^3, HO$.

Mr. E. Frankland (Journ. Chem. Soc. vol. ii. p. 286) states that he has succeeded in isolating this radical, ethyl; obtaining it by the action, at high temperatures, of zinc upon iodide of ethyl. He describes it as a colourless and inflammable gas, of specific gravity 2·0039, incondensible at zero, but as being converted under a pressure of 2·25 atmospheres, at 37·5°, into a colourless, transparent, and mobile liquid. Ethyl is not acted on by fuming sulphuric acid, is scarcely affected by nitric or by chromic acid; does not combine with iodine nor sulphur, but when exposed to nearly a red heat, is decomposed by the latter. In darkness chlorine does not combine with ethyl, but these gases unite in diffused daylight, contracting in volume, and giving rise to a colourless liquid.

The temperatures at which the formation of ether takes place are circumscribed within certain limits; when the mixture of acid and spirit boils at or below 260°, the sulphovinic acid is resolved into sulphuric acid, alcohol, and a trace of ether; if the boiling-point is between 260° and 310°, hydrated sulphuric acid, ether, and a little alcohol are produced; and if by the use of a large quantity of sulphuric acid, the boiling heat reaches 320°, the chief product is olefiant gas, accompanied by an oily liquid (heavy oil of wine), sulphurous and carbonic acids, a coaly residue containing sulphur remaining in the retort. Owing to the additional water the sulphuric acid acquires in the common way of operating, its power of action is much diminished, and therefore but half the quantity of spirit is directed to be added in the second distillation.

To remedy these inconveniences, and the loss attending the variations of temperature occurring in the usual mode of distilling ether, Mitscherlich invented a continuous process, in which the ebullition of the mixture is regulated by a constant supply of rectified spirit, so that the same acid is made to etherify an almost unlimited quantity of alcohol. For the details of this process I refer to Mitscherlich's Elemens de Chimie, Brande's Manual, and Fownes' Manual of Chemistry.

Properties.—Sulphuric Ether is a colourless, limpid, transparent liquid, of a pleasant smell and a pungent taste; it is extremely volatile, and its vapour when respired mixed with air produces very exhilarating effects. In the Materia Medica its specific gravity is directed not to exceed 0·750. According to Mitscherlich, its specific gravity is 0·724 at 55° Fahrenheit; when its density exceeds this, it contains either alcohol or water, or both.

Owing to the extreme volatility of ether a considerable quantity evaporates, even while being poured from one vessel to another, so that great care should be taken if dispensing or using it at night, or in the presence of artificial light. During evaporation it produces much cold, as may be felt by pouring it on the hand; if a small thin glass tube containing water and enveloped in cloth be dipped a few times in ether, allowing this liquid to evaporate after each immersion, the water may be frozen; in a cold atmosphere even mercury may be solidified by its cooling power. Faraday did not succeed in congealing pure ether when cooled to 166° below zero, but that usually met with, solidifies at —47°.

The specific gravity of the vapour of ether is 2·580, that of air being 1; so that although it is a very light liquid it yields a dense vapour. Under mean atmospheric pressure ether boils at about 96° of Fahrenheit, and *in vacuo*, even at 40° below zero; therefore, were it not for the pressure of the air, it would always exist in the aëriform state.

The vapour of ether is very inflammable, and during its combustion, under common circumstances, water is formed by the union of its hydrogen with the oxygen of the air, and carbonic acid by the combination of its carbon with the same element. When the vapour of ether is passed through a red-hot porcelain tube, it is decomposed, the products being carbon, water, carbonic oxide and carburetted hydrogen, in such proportions as to show that its composition is that above stated.

But little water is dissolved by ether, and water takes up only one ninth of its volume of this liquid. When this liquid contains alcohol it may be separated by shaking with water, which dissolves the alcohol, and the water dissolved by the ether may be separated by agitation with lime and subsequent distillation. In the process above given of the last Pharmacopœia, carbonate of potash is used for the last-mentioned purpose, and to neutralize any sulphurous acid.

Ether dissolves the resins, the alkaloids and many vegetable principles, and softens caoutchouc; it takes up a little sulphur and phosphorus; the solution of this last substance becomes luminous in the dark when poured on the hand or hot water. The alkalis potash and soda are not soluble in ether, which constitutes another marked difference between it and alcohol.

Tests, Impurities, and Adulterations.—See MATERIA MEDICA: *Ether.* Its volume should not be lessened when shaken in a tube with a concentrated solution of chloride of calcium.

Pharmacopœia Preparations.—Spiritus Etheris Compositus, Tinctura Lobeliæ Ætherea.

Medicinal Uses.—Stimulant and antispasmodic. Dose ♏xx to f℥ij, diffused in some aromatic water; this may be readily effected by rubbing the ether with a little spermaceti, about two grains of the latter to f℥j of the former. On account of the cold which it produces during evaporation, ether is a useful refrigerant applied to scalds and burns. It has also been employed of late to induce insensibility during surgical operations, but its use for this purpose has been superseded by that of chloroform.

SPIRITUS ÆTHERIS NITRICI.

Spirit of Nitric Ether.

Spiritus Nitri Dulcis, P.L. 1746.
Spiritus Ætheris Nitrosi, P.L. 1788.
Spiritus Ætheris Nitrici, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Rectified Spirit two pints,
Nitric Acid three fluidounces and a half;
Gradually add the acid to the spirit, and mix; then let twenty-eight fluidounces distil.

Its specific gravity is ·834. It turns the colour of litmus slightly red. Carbonate of soda being added, no bubbles of carbonic acid are liberated.

Remarks.—If the specific gravity exceed 0·834, water or free nitric acid, or both, are probably present. If litmus be strongly reddened, there is excess of acid, which the liberation of carbonic acid gas from carbonate of soda also proves.

The proportion of acid to spirit is apparently considerably altered from the process of the last Pharmacopœia, being as 1 to 12·5, instead of 1 to 9; but the nitric acid employed is now much weaker than that formerly used, so that in reality, the increase of nitric acid is but as 75 to 72; a quantity too inconsiderable to affect the product.

Process.—It has been observed that when sulphuric acid acts upon alcohol, ether is produced without decomposing the acid; when, however, nitric acid is employed, both it and the alcohol suffer decomposition. It has been mentioned that nitric acid is composed of oxygen and nitrogen; during its action upon alcohol it loses a portion of oxygen, and the pure ether formed, when separated from the water and undecomposed spirit with which it distils in the above process, is composed of

Four equivalents	of Carbon. .	6×4=	24	or	32·00
Five ,,	of Hydrogen	1×5=	5	,,	6·66
Four ,,	of Oxygen. .	8×4=	32	,,	42·67
One ,,	of Nitrogen	......	14	,,	18·67
			75.		100·

This is the ultimate composition of this ether; but it probably exists as a combination of oxide of ethyl (ether), and hyponitrous acid, forming *hyponitrite of oxide of ethyl*, or *hyponitrous ether*, consisting of

One equivalent of Hyponitrous Acid ..	38	or 50·66
One ,, of Ether	37	,, 49·34
Equivalent......	75.	100·

Formula...... $C^4 H^5 O, NO^3$.

The reactions which take place during the production of hyponitrous ether are both various and complicated, for different chemists have described, water, nitrogen, the protoxide and deutoxide of this gas, nitrous, carbonic, acetic, oxalic, saccharic, malic, formic, and hydrocyanic acids, and aldehyde as being formed during its preparation; most of these however appear to be accidental products often altogether absent, resulting from the oxygen lost by the nitric acid, and the elements of those portions of the alcohol which are decomposed but not converted into ether.

Both Berzelius and Dumas regard the process as essentially consisting of the reduction of nitric to hyponitrous acid by the elements of the alcohol giving rise to water and carbonic acid; the hyponitrous acid in its turn decomposing another portion of alcohol into water and ether, with which latter it combines and forms hyponitrous ether.

Very many processes have been described for obtaining this ether in a state of purity, but a method proposed by Kopp, and described by Kane in his 'Elements of Chemistry,' seems to me the easiest and best.

Properties.—Spiritus Ætheris Nitrici is a mixture of alcohol and hyponitrous ether; it is colourless, has a peculiar and fragrant ethereal odour; is very volatile, producing much cold during evaporation, and is extremely inflammable. It mixes with water and alcohol in all proportions. Its specific gravity should not exceed 0·834; but when the distillation is continued too long, the product is specifically heavier, high-coloured, has a pungent odour, is very acid, so as to act strongly on litmus paper, and to decompose the alkaline carbonates with effervescence. By keeping, it also becomes more acid than when recently prepared. It is to the presence of aldehyde, in the opinion of Dr. Bird, that Spiritus Ætheris Nitrici is indebted for the pungent acrid flavour it so frequently possesses, but from which it is quite free when the process of the Pharmacopœia is adopted.

Hyponitrous ether may be separated from the alcohol, water, and uncombined acid, which the preparation of the Pharmacopœia contains, by digesting lime reduced to powder in it, and subjecting the mixture to distillation; the hyponitrous ether distilling first. The pure hyponitrous ether thus procured is of a pale yellow colour; its smell is ethereal, and when diffused, not unlike that of ripe apples; its specific gravity at 39° is 0·886. It is extremely volatile, and it boils at about 70° F. under the usual pressure; it undergoes ebullition even when held in the hand; by evaporation it produces a great degree of cold, and yields a very inflammable vapour, which burns with a bright flame. It does not act upon litmus paper until it has suffered partial decomposition, which takes place spontaneously, especially when in contact with water, by which one part is dissolved and another decomposed; when mixed with a solution of potash, it yields hyponitrite and a little acetate of potash, and alcohol. The density of its vapour is 2·627. When passed through a porcelain tube heated to redness, hyponitrous ether yields nitrogen gas, nitric oxide gas, and cyanide of ammonia.

Medicinal Uses.—Refrigerant: Diuretic. Dose, f℥ss. to f℥ij.

ALKALINA.

ALKALIS AND THEIR SALTS.

LIQUOR AMMONIÆ ACETATIS.

Solution of Acetate of Ammonia.

Aqua Ammoniæ Acetatæ, P.L. 1788.
Liquor Ammoniæ Acetatis, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Dilute Acetic Acid a pint,
Sesquicarbonate of Ammonia nine drachms, or as much as may be sufficient.

To the Acid add the Sesquicarbonate to saturation.

Free from colour and smell; its specific gravity is 1·022. It does not change the colour of litmus nor of turmeric. It is not coloured when hydrosulphuric acid is poured in; nor does the addition of chloride of barium throw down anything. Whatever is thrown down by nitrate of silver is dissolvable in water, but especially in nitric acid. Potash being added it gives off ammoniacal, and sulphuric acid being added acetic vapours. The solution being evaporated, that which remains is destroyed in the fire.

Remarks.—Its not changing the colour of litmus nor turmeric shows that the saturation has been properly effected; its non-coloration by hydrosulphuric acid, generally indicates its freedom from metallic impurity. The test of chloride of barium shows the absence of sulphuric acid or a sulphate; nitrate of silver may at first yield a silky precipitate of acetate of silver, which will redissolve in abundance of water, or on the addition of nitric acid. Potash decomposes it into ammonia and acetate of potash, sulphuric acid into acetic acid and sulphate of ammonia. The absence of residue after heating the product of evaporation to redness, is a proof that the solution contains no fixed alkaline, nor other impurity.

In the present process diluted Acetic Acid is substituted for the distilled vinegar of the former Pharmacopœia, but the strength of the solution is not altered.

Process.—This is a case of single elective affinity and decomposition. In preparing this solution, carbonic acid gas is evolved, owing to the stronger affinity of the acetic acid for the ammonia with which it was combined, and acetate of ammonia is formed and remains in solution.

[1] 51 Acetic Acid ...	Acetic Acid...	51	68 ACETATE OF AMMONIA [1].
[1] 59 Sesquicarbonate of Ammonia.	*Ammonia*......	17	
	Carbonic Acid	33	33 Carbonic Acid [1·5].
	Water	9	9 Water.
110		110	110

If the sesquicarbonate of ammonia have become opaque by exposure to the air, a larger quantity will be required, on account of its having been partly converted into bicarbonate of ammonia. Such indeed is the variation in the state of the ammoniacal salt, that no precise quantity of it can be stated.

Properties.—This solution is colourless when pure; the solution should be repeatedly examined during preparation as to its state of saturation, before the whole of the ammoniacal salt is added, to ascertain that the quantity is not too large, and afterwards to prove that it is sufficient. It is better that the acid, rather than the alkaline salt, should appear to be in excess; for the carbonic acid which remains during some time in solution and which seems to indicate excess of acetic acid, is eventually dissipated; it is owing to the presence of this acid that solution of acetate of ammonia, when mixed with that of diacetate of lead, often gives a white precipitate of carbonate of lead. It is stated that the solution of Acetate of Ammonia is very liable to spontaneous decomposition. This preparation should therefore never be made in large quantity and kept, but care should be taken to have it always freshly prepared.

Composition.—Acetate of Ammonia is composed of

One equivalent of Acetic Acid	51	or	75·
One „ of Ammonia	17	„	25·
Equivalent......	68.		100·

Formula.... $NH^3, C^4 H^3 O^3$.

A fluidounce of this solution contains twenty-seven grains of anhydrous acetate of ammonia, a quantity which very closely approximates to the strength of the Liquor Ammoniæ Acetatis of the last Pharmacopœia.

Incompatibles.—Acids; potash, soda and their carbonates; lime and lime water; the acetate and diacetate of lead also, on account of the carbonic acid which usually remains diffused through the Liquor Ammoniæ Acetatis, are incompatible with it, and they are especially so, if it contain undecomposed sesquicarbonate of ammonia; carbonate of lead being in both cases precipitated.

Medicinal Uses.—This preparation is not unfrequently employed as a collyrium, in which case it is especially requisite that there should be no excess of sesquicarbonate of ammonia. When assisted by warmth and plentiful solution, it is an excellent diaphoretic, and in some cases it acts as a diuretic. Dose, ʒiij to ℥j. Externally as a lotion it is refrigerant.

LIQUOR AMMONIÆ CITRATIS.

Solution of Citrate of Ammonia.

Take of Citric Acid three ounces,
Distilled Water a pint,
Sesquicarbonate of Ammonia two ounces and a half, or as much as may be sufficient.

Dissolve the Acid in the Water, and add the Sesquicarbonate to saturation.

Remarks.—Citrate of Ammonia is now for the first time inserted in the Pharmacopœia. The observations and diagram upon the *Process* given under Liquor Ammoniæ Acetatis, equally apply to the formation of this salt, exchanging Acetic for Citric Acid throughout.

Properties.—The neutral citrate of ammonia has not yet been obtained in a solid form, its solution losing ammonia by evaporation. It is composed of

One equivalent of Citric Acid		165	or	76·39
Three „ of Ammonia	17×3=	51	„	23·61
Equivalent....		216		100·

Formula.... $3NH^3, C^{12} H^5 O^{11}$.

A fluidounce of this solution contains 77 grs. of the anhydrous salt.

Incompatibles.—The Alkalis, their carbonates and alkaline earths. The mineral Acids, and most metallic and earthy salts.

Tests, Impurities, and Adulterations.—The tests recommended to ascertain the purity of Liquor Ammoniæ Acetatis are all available in this case, excepting those of chloride of barium, and nitrate of silver, the precipitates produced by which should be soluble in nitric acid. Sulphuric acid will of course set citric acid free instead of liberating acetic fumes. Its most probable adulterant is tartrate of ammonia; to detect this, add a few grains of carbonate of potash to the solution and supersaturate with hydrochloric acid; if tartaric acid be present, a fine arenaceous precipitate of bitartrate of potash will be thrown down.

Medicinal Uses.—Diaphoretic, and febrifuge. Dose ʒiij to ℥j.

Citric Acid has now been transferred to the Materia Medica, but in pursuance of my plan, I take this opportunity of considering the nature, properties, and method of procuring

ACIDUM CITRICUM.

Citric Acid.

Acidum Citricum, P.L. 1809, P.L. 1824, P.L. 1836.

Take of the Juice of Lemons four pints,
Prepared Chalk four ounces and a half,
Diluted Sulphuric acid twenty-seven fluidounces and a half,
Distilled Water two pints;

Add the Chalk gradually to the Juice of Lemons made hot, and mix. Set by, that the powder may subside; after-

wards pour off the supernatant liquor. Wash the Citrate of Lime frequently with warm water. Then pour upon it the Diluted Sulphuric Acid and the distilled Water, and boil for a quarter of an hour. Press the liquor strongly through a linen cloth, and strain it. Evaporate the strained [liquor] with a gentle heat, and set it by, that crystals may be formed.

Dissolve the crystals, that they may be pure, again and a third time in water, and as often, strain, boil down, and set it aside.

Sources.—The juices of several fruits, such as gooseberries, currants, and raspberries contain citric acid; it is however especially met with in the juice of Lemons and of Limes.

Process.—LEMON-JUICE may be regarded as consisting principally of a solution of citric acid in water containing mucilage, which prevents its crystallization when sufficiently concentrated by evaporation; chalk consists of carbonic acid and lime, and is termed chemically, carbonate of lime; when this is added to the lemon-juice, the citric acid expels the carbonic acid with effervescence in the gaseous state. The citrate of lime thus formed being but sparingly soluble in water, most of it remains undissolved, and subsides in the state of a white powder, whilst the greater part of the mucilage of the lemon-juice is held in solution.

The first steps in the operation are then the formation of citrate of lime, and the separation of the mucilage; the aqueous part of the lemon-juice holding the mucilage in solution is rejected, and the citrate of lime is rendered free from any remains of it by repeated washing.

This citrate of lime when heated with the diluted sulphuric acid is decomposed, on account of the greater affinity existing between sulphuric acid and lime, than between citric acid and lime; the sulphate of lime thus formed subsides on account of its slight solubility, and is thrown away, and the citric acid remains in solution; by evaporation, crystals of citric acid are obtained, which are at first of a brownish colour, but rendered at last colourless by the repeated solution and crystallization directed to be performed.

CITRIC ACID is what is termed a *tribasic* acid, *i.e.* one equivalent combines with three equivalents of base to form neutral salts, and hence the necessity in the following diagrams of employing three equivalents both of carbonate of lime and sulphuric acid to one equivalent of citric acid: for the sake of convenience all the substances are represented as anhydrous.

[3] 150 Carbonate of Lime.	[3] *Carbonic Acid*		66 Carbonic Acid Gas [1].
	[3] *Lime*	84	
[1] 165 Citric Acid			249 Citrate of Lime [1].
315			315

[1] 249 Citrate of Lime.	[1] *Citric Acid*		165 CITRIC ACID [1].
	[3] *Lime*	84	
[3] 120 Sulphuric Acid.			204 Sulphate of Lime [3].
369			369

Composition.—Like Acetic Acid, Citric Acid is a compound of Carbon, Hydrogen, and Oxygen, consisting of

Twelve equivalents of Carbon..	6×12=	72	or 43·64
Five ,, of Hydrogen	1× 5=	5	,, 3·03
Eleven ,, of Oxygen..	8×11=	88	,, 53·33
		165	100·

Formula.... $C^{12} H^5 O^{11}$.

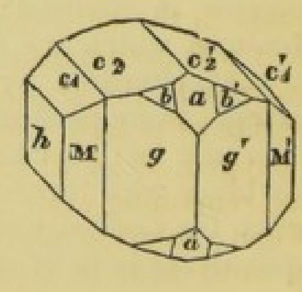
The above is the composition of the anhydrous acid as it exists in combination with oxide of silver. It crystallizes with three, four, and five equivalents of water, the proportions varying according to the circumstances under which the crystals are formed. The acid met with in commerce, of which the subjoined cut represents the crystalline form, consists of

One equivalent of anhydrous Citric Acid..	165
Four ,, of Water ....9×4=	36
Equivalent....	201

Formula.... $C^{12} H^5 O^{11}$, 4HO.

Properties.—Citric Acid is colourless, inodorous, extremely sour; the primary form of the crystal is a *right rhombic prism*, but which usually exhibits the planes described in the annexed figure: M and M′ being the lateral primary planes.

M on M′	101° 30′
M on *h*	129 15
M on *g*	163 23
g on *g*′	134 45
a on *a*′	111 50
a on *b*	161 30
h on c^1	139 45
h on c^2	121 15
c^1 on c^2	161 30
c^2 on c'^2	117 30



By exposure to a damp atmosphere the crystals absorb moisture. One hundred parts of citric acid require 75 of cold and 50 parts of boiling water to dissolve them. It is soluble in alcohol but not in ether. The solution reddens litmus paper strongly, and like lemon-juice, decomposes and becomes mouldy by keeping. When heated with nitric acid it is converted into oxalic acid, and when decomposed by hydrate of potash, it yields oxalate and acetate of potash. One drachm of the crystals of this acid saturates very nearly two drachms of crystallized carbonate of soda. About eleven drachms and a half of citric acid, dissolved in a pint of distilled water, give a solution equal in strength to lemon-juice.

The following table exhibits the quantities, very nearly, of crystallized citric acid, lemon-juice, and solution of citric acid prepared as above, necessary for the decomposition of one scruple of the alkaline salts named :

A Scruple of	*Lemon-juice or Solution of Citric Acid.*	*Citric Acid.*
Bicarbonate of Potash	fʒiijss	gr. 14.
Bicarbonate of Soda	fʒiiij	gr. 16.
Sesquicarbonate of Ammonia	fʒvss	gr. 23.

It is to be observed that in the above statement the sesquicarbonate of ammonia is considered as translucent and moderately hard ; if it be opaque and powdery, the change is owing to the evaporation of neutral carbonate of ammonia, and bicarbonate being thus formed, the saturating power of the salt is lessened to an extent which is uncertain.

Impurities, Adulterations, and Tests.—Any precipitate insoluble in nitric acid, occasioned in a solution of this acid by a solution of acetate of lead, may be regarded as being sulphate of lead, and would denote the presence of sulphuric acid or of a sulphate in the citric acid. If the citric acid contain any tartaric acid, it will decompose other salts of potash besides the tartrate, giving rise to the crystalline and difficultly soluble precipitate of bitartrate of potash. As citric acid consists of carbon, hydrogen and oxygen, all of which are dissipated at a red heat, any substance remaining after ignition is an impurity.

When a solution of citric acid is added to lime-water it remains clear until heat is applied, when it becomes turbid. This, and the test of a salt of potash as directed under Liquor Ammoniæ

Citratis, will evidence the absence of tartaric acid, the most usual adulterant. See also MATERIA MEDICA : *Acidum Citricum.*

Incompatibles.—Citric acid is incompatible with all alkaline solutions and substances, as ammonia, potash, soda, lime, magnesia, &c., converting them into citrates. It decomposes the alkaline, earthy and metallic carbonates, most acetates, the alkaline sulphurets, and soaps. It is also incompatible with tartrate of potash, which it converts into citrate and bitartrate of potash.

Pharmacopœia Preparations.—Liquor Ammoniæ Citratis, Ferri Ammonio-citras.

Medicinal Uses.—It is employed as a refrigerant, combined with potash, soda or ammonia in the proportions already stated. Half a fluidounce of lemon-juice, or an equal quantity of a solution of citric acid of the same strength so saturated, is generally exhibited as a dose.

LIQUOR AMMONIÆ SESQUICARBONATIS.

Solution of Sesquicarbonate of Ammonia.

Spiritus Salis Ammoniaci, P.L. 1721, P.L. 1746.
Aqua Ammoniæ, P.L. 1788.
Liquor Ammoniæ Carbonatis, P.L. 1809.
Liquor Ammoniæ Subcarbonatis, P.L. 1809, edit. alt., P.L. 1824.
Liquor Ammoniæ Sesquicarbonatis, P.L. 1836.

Take of Sesquicarbonate of Ammonia four ounces,
Distilled Water a pint;
Dissolve and strain.

Remarks.—This preparation is the same as in the last Pharmacopœia. It ought not to be prepared in large quantities at a time; for by keeping, or rather by occasional exposure to the air, its pungency and powers suffer diminution.

Incompatibles.—Liquor Ammoniæ Sesquicarbonatis is decomposed by acids, by potash and soda, and their carbonates; by lime, lime-water, magnesia, solution of chloride of calcium, alum, acidulous salts, as bitartrate and bisulphate of potash, and solutions of iron, except the potassio-tartrate, and similarly constituted compounds; bichloride of mercury, the acetate and diacetate of lead, and sulphate of zinc, are also incompatible with this salt. With sulphate of magnesia it affords no precipitate.

Pharmacopœia Preparation.—Linimentum Ammoniæ Sesquicarbonatis.

Medicinal Uses.—As an antacid; Dose ♏xxx to ♏xl in any bland liquid. It has been employed in the lithic acid diathesis. The Ammoniæ Liquor and Ammoniæ Sesquicarbonas having now been transferred to Materia Medica, which already contained Ammoniæ Hydrochloras and Ammoniæ Liquor fortior; I shall in this place describe the nature and properties of, as well as the theoretical views entertained respecting these highly important compounds, and shall first consider

AMMONIÆ HYDROCHLORAS.

Hydrochlorate of Ammonia.

This salt has long been known by the name of Sal-Ammoniac, and afterwards as Muriate of Ammonia; it was originally procured by burning camels' dung, the usual fuel of the Desert, and took its name from a district in Egypt called Ammonia, or Ammonium, the modern Siwah, an oasis in the Zahara.

The present appellation of hydrochlorate of ammonia, indicates that it is composed of hydrochloric acid and ammonia; other names which it has received in consequence of the theoretical views entertained respecting its nature will presently be stated.

This salt is now procured from the ammoniacal liquor resulting from coal during the process of gas-making, or from the distillation of bones in producing animal charcoal for the use of the sugar refiners; the ammoniacal liquor is converted into sulphate of ammonia either by the direct addition of sulphuric acid, or by double decomposition with sulphate of lime; the resulting sulphate of ammonia is mixed with chloride of sodium (common salt), and the mixture sublimed; by double decomposition hydrochlorate of ammonia is liberated, which being volatile, sublimes, and is condensed in the upper and cool part of the apparatus, whilst sulphate of soda, a fixed salt, remains behind. Sometimes the ammoniacal liquor is saturated with crude hydrochloric acid, *spirits of salt* of commerce, and the solution crystallized. The discoloured hydrochlorate of ammonia thus obtained is carefully roasted to destroy the brown colouring and tarry matters, and then sublimed.

Properties.—This salt is met with in large hemispherical cakes; it is tough, fibrous in structure, and unalterable by exposure to dry but is slightly deliquescent in damp air. Its specific gravity is 1·450. It dissolves in three times its weight of water at 60°, producing much cold during solution, and in its own weight of boiling-water; from its boiling solution traces of the salt are vaporized, although it is not volatile at common temperatures; it is also sparingly soluble in alcohol. The aqueous solution, especially after long keeping, generally reddens litmus paper slightly, by evaporation cubic, and sometimes octohedral, crystals are deposited from this solution. By heat this salt totally sublimes without previous fusion. The fixed alkalis and the alkaline earths evolve ammonia, and sulphuric acid expels hydrochloric acid from it.

Composition.—When equal volumes of hydrochloric acid gas, and gaseous ammonia, are mixed over mercury, complete condensation takes place, and hydrochlorate of ammonia is produced. Thus

	Grains.
100 cubic inches of Hydrochloric Acid Gas weigh	39·775
100 cubic inches of Ammoniacal Gas weigh	18·275
	58·050

so that this salt consists of

One equivalent of Hydrochloric Acid	37	or 68·52
One „ of Ammonia...........	17	„ 31·48
Equivalent......	54.	100·

Formula.... NH^3, HCl.

Now Ammonia consists of Nitrogen and Hydrogen; and although the former, like the latter, has never yet been decomposed, and when uncombined is known to exist only in the aëriform state, and therefore must still be regarded as an elementary body, yet there are several strong reasons for believing nitrogen to be really a compound substance, or at any rate that when combined with hydrogen, in certain proportions, it gives rise to a compound body possessing, so far as we have yet been able to investigate its properties, all the qualities of a metal. This view, propounded by Ampère, and warmly espoused by Berzelius, regards the compound formed when a globule of mercury is exposed to the action of the galvanic current in contact with a solution of ammonia, or a moistened fragment of the hydrochlorate, as a true *amalgam*, consisting of mercury and a metal termed *Ammonium*. Moreover the series of ammoniacal salts, instead of being completely exceptional, become. under this view, completely analogous to ordinary metallic salts.

Thus it has been held by Berzelius that when hydrochloric acid and ammoniacal gas act upon each other, hydrogen is transferred from the hydrochloric acid to the ammonia, and consequently that the salt, which considered as hydrochlorate of ammonia would be written NH^3, HCl, becomes NH^4, Cl, in which NH^4 represents *ammonium*, and this combining with the chlorine deprived of hydrogen, becomes *chloride of ammonium.*

When, on the contrary, an oxacid, as sulphuric acid, is added to a solution of ammonia, this hypothesis supposes that an equivalent of water suffers decomposition; so that the salt usually called sulphate of ammonia, NH^3, SO^3, HO, becomes *sulphate of oxide of ammonium*, or NH^4 O, SO^3: in this case the ammonia becomes ammonium by combining with the hydrogen of the decomposed water, and this is simultaneously converted into an oxide by uniting with its oxygen; and being thus analogous to a metal combined with oxygen, it has acquired the condition requisite to its combination with an acid, and consequently unites like a metallic oxide with the sulphuric acid, as above-mentioned, forming the sulphate of oxide of ammonium.

Professor Graham appears to adopt the above-described hypothesis, regarding sal-ammoniac as chloride of ammonium, and sulphate of ammonia as sulphate of oxide of ammonium; but in the case of the sulphates of metallic oxides, he seems to favour the opinion, that the oxygen of the base is transferred to the acid; so that while the oxide is reduced to the metallic state, the sulphuric acid becomes, by the addition of the oxygen, a compound represented by SO^4; for which Professor Graham proposes the name of *sulphatoxygen*, and that of *sulphatoxide*, to express a compound of it and a metal; so that on the "old view" that which was called *sulphate of soda*, is on the "new view" *sulphatoxide of sodium*, or Na, SO^4, instead of, as formerly, NaO, SO^3.

The late Professor Daniell, grounding his opinion on the results of electrical decompositions, has also offered an explanation of the constitution of the ammoniacal and other salts, which coincides, except in nomenclature, with the opinions put forth by Professor Graham. Sir Robert Kane, on the other hand, considers that ammonia, instead of acquiring an equivalent of hydrogen to become *ammonium*, loses one to form *amidogen*, represented by NH^2; and he regards sal-ammoniac neither as hydrochlorate of ammonia nor as chloride of ammonium, but as *chloramidide of hydrogen*: NH^2, H [=ammonia] representing *amidide of hydrogen*, and this combined with *chloride of hydrogen*, HCl [=hydrochloric acid] yields NH^2H, HCl, *chloramidide of hydrogen* [=NH^3, HCl, hydrochlorate of ammonia]. The nature of the salts formed by the action of oxacids upon ammonia, corresponding to this view of the action of hydracids, is this: when sulphuric acid, taking this acid as an example, acts upon ammonia, there results neither sulphate of ammonia nor sulphate of oxide of ammonium, but *sulphate of amidide of hydrogen*, NH^2, H, SO^3. This may be considered as a type of the compounds resulting from the action of oxacids upon ammonia on Sir R. Kane's hypothesis.

Thus NH^2, *amidogen*, may be regarded as a compound analogous to oxygen, chlorine, &c., NH^3 *ammonia*, as a salifiable base, and NH^4 *ammonium*, as possessing the properties of a metal forming oxides, chlorides, &c. It has been supposed that the hypotheses above described offer more simple and philosophical explanations of the action of acids on metals and of the nature of the resulting compounds, than those hitherto adopted. As, however, neither ammonium, oxide of ammonium, amidogen, nor sulphatoxygen has ever been isolated, it is correctly observed by Professor Graham, that to whichsoever of the hypotheses "we give preference, we can scarcely avoid using the language of the old theory in the present state of chemical science."

Impurities, Adulterations, and Tests.—Hydrochlorate of Ammonia presents many obstacles to adulteration; it is sometimes of a yellowish colour, owing to the presence of sesquichloride of iron, which forms a double salt with a portion of the hydrochlorate. It should be completely volatilized when ignited.

Incompatibles.—Some acids, the alkalies, and their carbonates, lime, and the salts of lead and silver.

Pharmacopœia Preparations.—Ferri Ammonio-chloridum, Liquor Hydrargyri Bichloridi.

Pharmacopœia Uses.—Spiritus Ammoniæ Aromaticus, Spiritus Ammoniæ Fœtidus.

Medicinal Uses.—It has been employed externally as a stimulant, resolvent, or discutient. In this country it is rarely employed internally. Dose, gr. v to ʒss.

LIQUOR AMMONIÆ, P.L. 1836.

Solution of Ammonia.

Aqua Ammoniæ Puræ, P.L. 1788.
Liquor Ammoniæ, P.L. 1809, P.L. 1824.

LIQUOR AMMONIÆ FORTIOR, P.L. 1836.

Stronger Solution of Ammonia.

Both these solutions are now placed in the Materia Medica; their specific gravity is respectively 0·960 and 0·882; the former containing ten per cent. and the latter thirty per cent. of ammonia. They may both be prepared simultaneously by the following process, which I insert rather than the process of the last Pharmacopœia, that yielding only *Liquor Ammoniæ*.

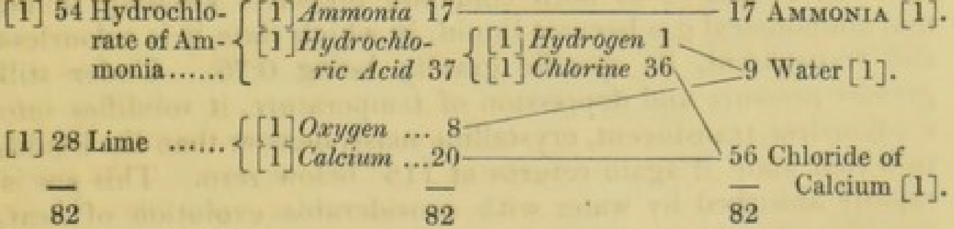
Take of Hydrochlorate of Ammonia twelve ounces,
Lime nine ounces,
Water twelve fluidounces,
Distilled Water eight fluidounces;

Slack the lime by the gradual addition of water, and put it into a retort with the remainder of the water, with the hydrochlorate broken into small pieces.

Adapt a tubulated receiver to the retort, which should dip into four fluidounces of the distilled water, contained in a Woulfe's bottle; connect this with a second Woulfe's bottle containing an equal quantity of distilled water. Then apply heat to the retort as long as ammonia continues to come over, keeping the receivers cool.

The first receiver will contain Liquor Ammoniæ fortior, and the second Liquor Ammoniæ. Should the latter not be of specific gravity 0·960, it must be rendered so by adding sufficient of the stronger solution of ammonia if too weak, or water if too strong. One measure of the stronger solution mixed with two measures of water will make Liquor Ammoniæ.

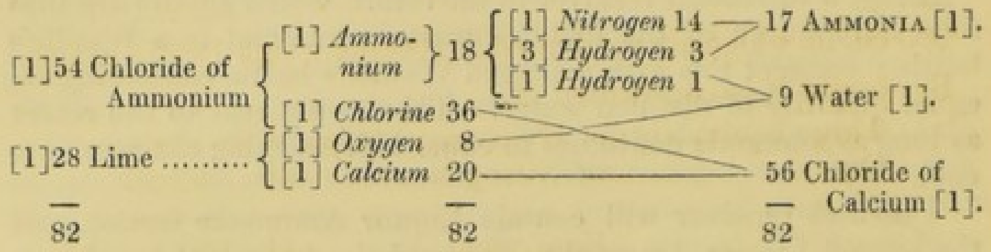
Process.—Regarding sal-ammoniac as *hydrochlorate of ammonia,* the changes which occur are these:—one eq. of hydrochlorate of ammonia 54 is composed of one eq. of AMMONIA 17, and one eq. of hydrochloric acid 37, consisting of one eq. of *chlorine* 36 and one eq. of *hydrogen* 1. One eq. of lime 28, contains one eq. of *calcium* 20, and one eq. of *oxygen* 8. When these substances react upon each other, not only is the one eq. of hydrochlorate of ammonia decomposed and one eq. of ammonia 17 evolved, but the one eq. of hydrochloric acid 37 and the one eq. of lime 28 are resolved into their respective elements and give rise to one eq. of chlorine 36, one eq. of hydrogen 1, one eq. of calcium 20, and one eq. of oxygen 8, which thus re-arrange themselves: the one eq. of ammonia 17 is volatilized and condensed in the receiver, whilst the one eq. of hydrogen 1 combines with the one eq. of oxygen 8, to form one eq. of water 9, which either remains in the retort, or is partially raised in vapour with the ammonia, and the one eq. of chlorine 36 unites with the one eq. of calcium 20, producing one eq. of chloride of calcium 56, which remains in the retort.



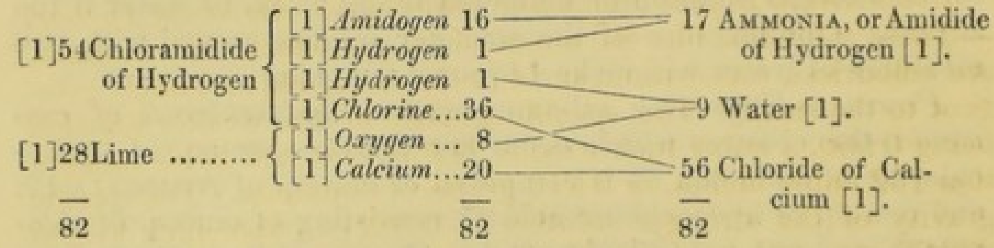
If, in accordance with the views of Berzelius, sal-ammoniac be regarded as *chloride of ammonium*, or with those of Kane as *chloramidide of hydrogen*, the results of the decomposition will be precisely similar, the elements of the ammoniacal salt being merely differently arranged in each of these three cases.

The decompositions in these instances will be understood from the annexed diagrams, without a repetition of the verbal description.

Theory of Berzelius.



Kane's Theory.



Properties of Ammoniacal Gas.—Ammoniacal gas is transparent, colourless, and of course invisible. Its smell is extremely pungent, and its taste acrid. Its specific gravity compared with atmospheric air is as 0·5893 to 1, and 100 cubic inches weigh 18·275 grains. An animal immersed in it is quickly killed; it extinguishes the flame of a taper, enlarging it before extinction. It possesses most powerful alkaline properties, turning vegetable yellow colours brown, and blues green; it combines readily with acids and destroys their power of reddening vegetable blue colours. When ammoniacal gas is mixed with oxygen gas, and fired by a taper, water is formed, and nitrogen gas left; by being passed through a red-hot tube, it is resolved into hydrogen and nitrogen gases in the proportions stated below; the same effect is produced by electricity.

When subjected to both cold and pressure, Faraday found that ammoniacal gas became liquid, in which state it is colourless and transparent, its specific gravity being 0·76. Under still greater pressure and depression of temperature, it solidifies into a colourless, translucent, crystalline mass, heavier than the liquid, to which state it again returns at 113° below zero. This gas is rapidly absorbed by water with considerable evolution of heat. Ice also absorbs it, at the same time liquifying and producing cold. At a temperature of 50° water absorbs about 650 times its volume of this gas, and at a lower temperature even more, amounting to one-half its weight, the water at the same time increasing considerably in volume.

Composition.—Ammoniacal gas is composed of 3 volumes of hydrogen gas and 1 volume of nitrogen gas, condensed by combination into 2 volumes; or which is the same, it consists of

150 cubic inches	of Hydrogen gas,	weighing	3·225 grains.
50 „	„ of Nitrogen gas,	„	15·050 „
200 cu. in.	which are condensed to 100	and weigh	18·275 grains.

By weight it is constituted of

Three equivalents	of Hydrogen 1×3=	3	or 17·64
One „	of Nitrogen	14	„ 82·36
	Equivalent.....	17.	100·

Formula...... NH^3.

Properties of Liquor Ammoniæ, and Liquor Ammoniæ Fortior.—These solutions, like the ammoniacal gas which they contain, are colourless, transparent, acrid to the taste, and extremely pungent to the smell. The specific gravity of the weaker solution being 0·960, a cubic inch weighs 242·36 grs., and holds in solution 132 cubic inches, or 24·12 grains of ammonia. The specific gravity of the stronger solution is 0·882; a cubic inch weighs 222·66 grs., and holds in solution 360 cubic inches, or 65·8 grs. of ammonia, being respectively about 10 and 30 per cent. of this gas.

Solution of ammonia is strongly alkaline, turning the vegetable yellow colours red, and blues, green; by exposure to the air it rapidly loses ammonia; this is particularly the case with the stronger solution. It is much employed in chemical investigations, and analyses of earthy and metallic substances.

Incompatibles.—Acids, acidulous and most earthy and metallic salts; it does not decompose the salts of lime, barytes or strontia, those of magnesia only partially; the potassio-tartrate of iron is not affected by it; it precipitates the protosalts of mercury black, and its persalts white.

Impurities and Tests.—See MATERIA MEDICA: *Ammoniæ Liquor*, and *Ammoniæ Liquor Fortior.* These solutions, as met with in commerce, at times contain an empyreumatic oil, which imparts its characteristic odour. It has also been stated that they sometimes contain *naphthalin*, *picolin*, and *pyrrol*, derived from the original source of the ammonia, the coal-gas liquor; the last of these substances may be detected by adding excess of sulphuric or nitric acid, which produce a red colour, passing into a purple if pyrrol be present. To detect minute traces of ammonia, the suspected substance should be mixed with a little slaked lime in a test tube, and moistened with water. Heat being then gently applied, the vapour from the tube should restore the blue colour of reddened litmus paper, and give dense white fumes when brought in contact with a rod moistened with hydrochloric acid.

Pharmacopœia Preparations of Liquor Ammoniæ.—Hydrargyri Ammonio-chloridum, Linimentum Ammoniæ, Linimentum Hydrargyri, Ferri Ammonio-Citras, Ferri Potassio-tartras.

Liquor Ammoniæ Fortior is employed in Tinctura Ammoniæ Composita, and Linimentum Camphoræ Compositum.

Medicinal Uses.—Liquor Ammoniæ is stimulant, rubefacient and antacid; it may be exhibited in milk, water, or any cold liquid which is not incompatible with it. Dose ♏x to ♏xxx. If it should be swallowed by mistake, the best antidote is vinegar or lemon-juice.

AMMONIÆ SESQUICARBONAS, P.L. 1836.

Sesquicarbonate of Ammonia.

Sal Volatilis Salis Ammoniaci, P.L. 1746.
Ammonia Præparata, P.L. 1788.
Ammoniæ Carbonas, P.L. 1809.
Ammoniæ Subcarbonas, P.L. 1809, edit. alt., P.L. 1824.

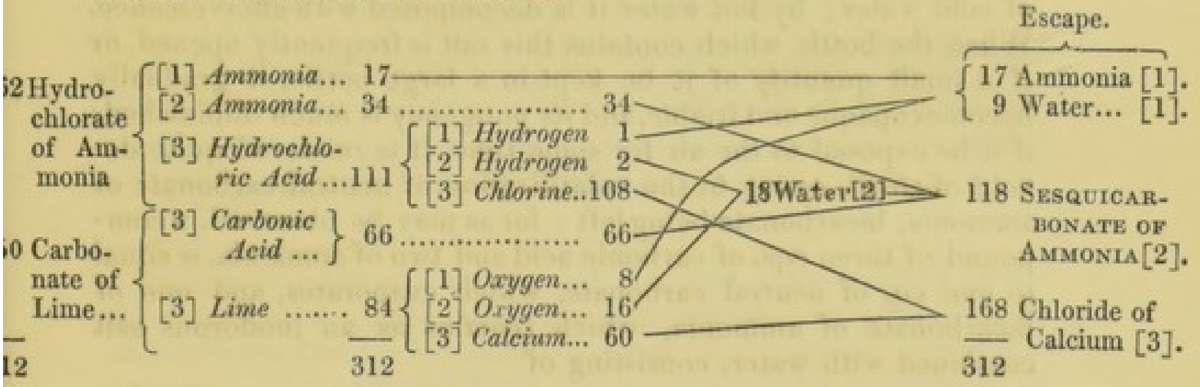
Take of Hydrochlorate of Ammonia a pound,
Chalk a pound and a half;

Rub them separately to powder; then mix, and with heat, gradually increased, sublime.

Remarks.—The reaction in this case is more complicated than that of the last; instead of lime, carbonate of lime is employed to decompose the hydrochlorate, and the product is consequently a carbonate of ammonia.

Process.—If hydrochlorate of ammonia in the solid state could be so decomposed by carbonate of lime that the whole of the products of the decomposition could be re-combined, we should obtain *monohydrated carbonate of ammonia*, consisting of one eq. of ammonia, one eq. of carbonic acid, and one eq. of water; but it so happens that the carbonate of ammonia obtained by this process is not a neutral but, as its name indicates, a supersalt; we must therefore, in order to explain its formation, employ three equivalents, both of the salt of ammonia and of lime, to show what occurs when these compounds suffer mutual decomposition.

Three eqs. of hydrochlorate of ammonia 162, are composed of three eqs. of *ammonia* 51, and three eqs. of *hydrochloric acid* 111, these latter consist of three eqs. of *hydrogen* 3, and three eqs. of *chlorine* 108. Three eqs. of carbonate of lime contain three eqs. of *carbonic acid* 66, and three eqs. of *lime* 84, which consist of three eqs. of *oxygen* 24, and three eqs. of *calcium* 60. When these substances react, one eq. of the water 9 formed, and one eq. of ammonia 17 set free, escape during sublimation; consequently there remain two eqs. of ammonia 34, three eqs. of carbonic acid 66, together with two eqs. more of water 18 formed, these combine together, sublime, and form SESQUICARBONATE OF AMMONIA; whilst the three eqs. of chloride of calcium 168 remain in the retort.



Composition.—It is evident from this diagram, that if it were not for the escape of an equivalent both of ammonia and of water, the product, as previously stated, would be a neutral monohydrated carbonate of ammonia, consisting of

Three equivalents of Ammonia	17×3=	51
Three " of Carbonic Acid ..	22×3=	66
Three " of Water..........	9×3=	27
		144

This, however, proves not to be the case, for owing to the escape of ammonia and water only 118 parts are produced, consisting of

Two equivalents of Ammonia	17×2=	34	or	28·81
Three " of Carbonic Acid	22×3=	66	"	55·93
Two " of Water........	9×2=	18	"	15·26
Equivalent......		118.		100·

Instead of regarding it as a compound of three eqs. of acid, two eqs. of base, and two of water, it is more convenient to consider it as consisting of one and a half eq. of carbonic acid, one eq. of ammonia, and one eq. of water, or as a *monohydrated sesquicarbonate of ammonia.* Under this view it is composed of

One equivalent of Ammonia	17
One and a half equivalent of Carbonic Acid 22×1·5=	33
One equivalent of Water........................	9
Equivalent	59

Formula...... $2NH^3, 3CO^2, 2HO$; or $NH^3, 1\frac{1}{2} CO^2, HO$.

Ammonia, carbonic acid, and water, combine in several other proportions, and form definite salts.

Properties.—When recently prepared, sesquicarbonate of ammonia is a moderately hard, colourless, translucent mass, of a striated crystalline appearance. Its smell is pungent, and its taste sharp and penetrating; turmeric paper when held over it is turned of a reddish brown colour by the carbonate of ammonia which escapes. It is soluble in about four times its weight of cold water; by hot water it is decomposed with effervescence. When the bottle which contains this salt is frequently opened, or if a small quantity of it be kept in a large bottle, it gradually becomes opaque and friable, and its pungency is much diminished; if it be exposed to the air for some time, it is rendered quite devoid of smell, owing to the volatilization of neutral carbonate of ammonia, bicarbonate being left; for as may be observed, a compound of three eqs. of carbonic acid and two of ammonia, is equal to one eq. of neutral carbonate, which evaporates, and one of bicarbonate of ammonia, which remains as an inodorous salt combined with water, consisting of

One equivalent	of Ammonia............	17	or	21·52
Two ,,	of Carbonic Acid..	22×2=44	,,	55·70
Two ,,	of Water........	9×2=18	,,	22·78
	Equivalent......	79.		100·

When lumps of the sesquicarbonate are exposed to the action of water, neutral carbonate of ammonia dissolves out, and bicarbonate remains.

Impurities and Tests.—See MATERIA MEDICA: *Ammoniæ Sesquicarbonas.* It cannot be fraudulently adulterated when in lumps.

Incompatibles.—See LIQUOR AMMONIÆ SESQUICARBONATIS.

Pharmacopœia Preparations.—Cupri Ammonio-sulphas, Liquor Ammoniæ Acetatis, Liquor Ammoniæ Sesquicarbonatis, Liquor Ammoniæ Citratis.

Pharmacopœia Use.—Zinci Oxydum.

Medicinal Uses.—It is stimulant, antispasmodic, diaphoretic, powerfully antacid, and in large doses emetic. In the form of smelling salts it is useful in syncope and hysteria. It must not be kept in powdered mixtures, and although in the form of pill its properties are longer retained, it is by no means an eligible mode of exhibiting it. Dose grs. iij to xx;—grs. xxx are emetic.

ATROPIÆ SULPHAS.

Sulphate of Atropia.

Take of Dilute Sulphuric Acid two fluidrachms,
Atropia seven and a half scruples, or as much as may be sufficient,
Distilled Water half a fluidounce;

The acid being mixed with the water, add the Atropia gradually to saturation. The solution is to be strained and evaporated at a gentle heat, that crystals may be formed.

We intend this salt for external use only.

Remarks.—Atropia is now for the first time inserted in the Pharmacopæia. This alkaloid is procured from the *Atropa Belladonna*, Deadly Nightshade, a plant of the natural family *Solanaceæ*. It is obtained from the root, although it exists in all parts of the plant, which is indigenous, growing in hedges and waste ground, on calcareous soils; the root is sometimes more than a foot in length, and is externally greyish or brownish white, and internally white; it has but little odour; its taste is slight and sweetish.

Process.

Take of Deadly Nightshade root, bruised, ten pounds,
Rectified Spirit one gallon,
Hydrate of Lime one ounce,
Distilled Water eight fluidounces,
Carbonate of Potash, and Dilute Sulphuric Acid, as much as may be sufficient.

Digest the Deadly Nightshade root in half of the spirit for a week, pour off the tincture, press the residue and digest it in the remainder of the spirit as before, again pour off the tincture, and press the residue. Mix and filter the tinctures, add the lime and shake the mixture frequently during twenty-four hours; filter, and slightly supersaturate with sulphuric acid, let it stand to allow the sulphate of lime to deposit, and filter again to separate it. Then distil the tincture to one-half, add the distilled water, and evaporate the remaining spirit by a very gentle heat. Reduce the solution by continuous evaporation to one-third, and when cold gradually add to it a concentrated solution of carbonate of potash as long as precipitation occurs.

The precipitate, which is impure Atropia, is to be separated after twelve hours' standing, by stirring and filtration, then dried without being washed, rubbed into a paste with a little water, pressed as dry as possible in blotting-paper and dissolved in five times its weight of spirit; to the tincture add six times its weight of distilled water, and if it does not become turbid evaporate till this occurs; after this the liquid is to be left at rest for about twenty-four hours, and crystals will form of a yellowish colour. The crystals may be purified by solution in spirit, digestion with animal charcoal, and re-crystallization as before.

The employment of chloroform to abstract this alkaloid from the expressed juice of the fresh herb has been lately suggested (see Chemical Gazette, vol. viii. p. 459), and appears to be a ready and excellent method of obtaining it.

Properties.—Atropia is extremely poisonous; one-tenth of a grain causes most unpleasant symptoms when taken internally; it occurs in small white, silky, crystalline prisms; it is inodorous, and possesses a nauseous, bitter, and somewhat acrid taste. It is not affected by exposure to air; is slightly soluble in cold water, but authorities differ widely as to the degree of solubility, more soluble in hot water, still more so in ether, and most of all in rectified spirit. The aqueous solution is alkaline, restoring the blue colour to reddened litmus. Atropia fuses at about 200°, and at a somewhat higher temperature it is partly decomposed, and partly volatilized. It exists in the plant probably combined with *Atropic Acid*; it forms definite salts with the acids, the acetate and sulphate being more easily crystallized than the nitrate or hydrochlorate; these salts are decomposed by the alkalies, Atropia being precipitated. Heated with potash this alkaloid is decomposed and ammonia is evolved.

Composition.—According to Liebig, whose analyses have been since confirmed by Dr. von Planta, Atropia is composed of

34	equivalents	of Carbon ..	6×34=	204	or	70·58
23	,,	of Hydrogen	1×23=	23	,,	7·96
1	,,	of Nitrogen..........		14	,,	4·85
6	,,	of Oxygen ..	8× 6=	48	,,	16·61
		Equivalent......		289.		100·

Formula...... $C^{34} H^{23} N O^{6}$.

Adulterations, Impurities, and Tests.—The value of most of these vegetable alkaloids and their salts renders them peculiarly liable to fraudulent adulteration, against which the best safeguards are either to prepare them at home, or at any rate to procure them from a maker of reputation. The salts of Atropia are reddened by tincture of iodine, yield bright yellow precipitates with chloride of gold, and are wholly dissipated by ignition.

Medicinal Uses.—Atropia and its sulphate should only be used externally for dilating the pupil of the eye. One grain of the sulphate dissolved in f℥j of distilled water is a proper solution for this purpose.

LIQUOR MORPHIÆ ACETATIS.

Solution of Acetate of Morphia.

Take of Acetate of Morphia, four drachms,
Acetic Acid fifteen drops,
Distilled Water a pint,
Proof Spirit half a pint;
Mix and dissolve.

Remarks.—Acetate of Morphia has been transferred to Materia Medica, and the above solution is directed to be prepared as a convenient standard solution of this salt of morphia. For the *Mode of Preparation* and *Properties,* both of this and the succeeding salt, see Extractum Opii.

Incompatibles.—The stronger acids, the alkalis and alkaline earths, and many or most earthy and metallic salts.

Medicinal Uses.—Morphia is the most active principle of opium, but owing to its sparing solubility in water is never used medicinally whilst uncombined. Its compounds with both the acetic and hydrochloric acids form salts, which being soluble admit of being exhibited in very small doses and with great effect. The advantage which they seem to possess over opium is chiefly ascribed to the absence of *narcotin*; their use in ordinary cases not being followed by either headache or sickness. A fluidrachm both of this preparation and of the solution of hydrochlorate of morphia contains one grain of the acetate, or hydrochlorate of this alkaloid. Dose ♏vj to ♏xv.

LIQUOR MORPHIÆ HYDROCHLORATIS.

Solution of Hydrochlorate of Morphia.

Take of Hydrochlorate of Morphia four drachms,
Distilled Water a pint,
Proof Spirit half a pint;
Mix and dissolve.

Remarks.—The observations appended to the preceding preparation equally apply to the present.

AQUÆ.

WATERS.

Aqua destillata has been transferred to Materia Medica. In the present Pharmacopœia distilled water is in most cases directed to be used whenever water is employed, excepting in procuring the preparations of this section when obtained by distillation, in which case the employment of distilled water in the first instance could be attended with no advantage. I subjoin the process for obtaining distilled water, and some remarks on the properties of Water.

AQUA DESTILLATA, P.L. 1836.

Distilled Water.

Aqua Distillata, P.L. 1788, P.L. 1809.
Aqua Destillata, P.L. 1824.

Take of Water ten gallons;

First let two pints distil, which being thrown away, let eight gallons distil. Keep the distilled Water in a glass bottle.

Remarks.—Spring, river, and lake water are frequently rendered turbid by suspended earthy or organic impurities, which may be separated by subsidence or filtration; they also generally contain salts, which being held in solution are not obvious, but their presence is usually detected by the effects which they produce; such are commonly called *hard waters,* and may be recognized by their property of causing a solution of soap to curdle; but most *deep-well* water, generally, but usually improperly, called *Artesian well-water,* contains saline impurity, although its hardness is often disguised by the presence of an alkaline carbonate. The saline impurities dissolved in waters are usually carbonate of lime, and sometimes carbonate of magnesia and of iron held in solution by carbonic acid; common salt, sulphate of lime, and more rarely carbonate of soda, sulphate of soda, or sulphate of magnesia. Many other saline impregnations occasionally occur in particular springs, but these require no notice here. There are some preparations which are discoloured or their solutions rendered turbid by the above-mentioned salts, and these are employed as *tests* for detecting them. Thus *Lime Water* renders turbid any water containing carbonic acid, carbonic acid holding earthy carbonates in solution, or any salt of magnesia or of iron, if these last are in appreciable quantity.

Tincture of Galls, when a salt of iron is present, gives a reddish purple colour, and eventually a purple precipitate. This is particularly marked if a drop or two of solution of ammonia be afterwards added to the water.

Chloride of Barium.—If any sulphate be present, this will give a white precipitate of sulphate of barytes, insoluble in nitric acid.

Turmeric Paper.—If the evaporated water render this brown, the effect is probably due to carbonate of soda, existing as bicarbonate in the water.

Oxalate of Ammonia gives a precipitate of oxalate of lime if any salt of lime be present; and if after the separation of this, and considerable evaporation of the water, the addition of hydrochlorate of ammonia, ammonia, and phosphate of soda, with rapid agitation by a glass rod causes precipitation, it is owing to magnesia.

Nitrate of Silver.—If this gives a white precipitate insoluble in nitric acid, common salt is present.

Process.—The object in distilling water is of course to free it from these impurities; this is effected by first converting it into steam, and then condensing it. The vessel in which this is performed is called a *Still*; the *body* in which the water is boiled is usually of copper, and the *head* and *neck* should be of tin; from these the steam is conveyed into a spiral pipe, also of tin, called the *worm*, which is placed in *the worm-tub*, and surrounded with cold water, which condenses it. The saline and earthy impurities not being volatile remain in the *body of the still.*

Many pharmaceutical chemists are, I believe, in the habit of distilling water from the still which they also use in the preparation of aromatic distilled waters; this should not be done, for under these circumstances the distilled water will have a faint smell and taste of the herb last distilled, which renders the water impure, so that when nitrate of silver is added to such water, it imparts a reddish colour to it, owing to the presence of organic matter.

Properties.—Distilled water is colourless, transparent, inodorous, and vapid on account of the absence of air or carbonic acid gas. It is not affected by any of the above-named reagents. A cubic inch at 62° weighs 252·458 grs., and a fluidounce 437·5 grs. =ʒvij. grs. xvijss. Apothecaries weight, or 1 ounce Avoirdupois. A pint weighs 8750 grs.=℥xviij. ʒj. ℈ijss. Apothecaries, or 20 ounces=1¼ pound Avoirdupois.

The boiling-point of water under common circumstances is 212°; it possesses a greater specific gravity at 39·2°, than at any temperature above or below that point; when congealed into *ice* its specific gravity is 0·916, water being 1, and its melting-point 32°. Water is about 815 times heavier than atmospheric air.

Composition.—Water is composed of 2 volumes of Hydrogen Gas and 1 volume of Oxygen Gas condensed by combination into 2 volumes, or what is the same thing, of

Hydrogen Gas	1 volume	Specific gravity ...	0·06935
Oxygen Gas	·5 volume	Half specific gravity	·55480
Aqueous vapour	1 volume	Specific gravity...	·62415

By weight it consists of

One equivalent of Hydrogen....	1	or	11·12
One „ of Oxygen	8	„	88·88
Equivalent......	9		100·

Formula...... HO.

Uses.—Distilled water is advantageously employed in the preparation of vegetable infusions, decoctions and extracts; for the saline and earthy impurities which hard water contains impair its solvent power with respect to some vegetable principles. It is evident also that it must be employed in making those chemical reagents and preparations which the saline matter of common water would render impure or occasion precipitation, inducing not only loss, but variation in the strength of the solutions.

AQUA ANETHI.

Dill Water.

Aqua Seminum Anethi, P.L. 1746.

Aqua Anethi, P.L. 1788, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Dill, bruised, a pound and a half,
Water two gallons;
Let a gallon distil.

Or,

Take of Oil of Dill two fluidrachms,
Powdered Silex two drachms,
Distilled Water a gallon;

First rub the Oil carefully with the Silex, afterwards with the Water, and strain the solution.

Remarks.—DILL, is a plant belonging to the natural family *Umbelliferæ*; it is a native of the south of Europe, Egypt, &c. The fruit, usually called *dill seed*, is strongly aromatic, the taste being warm, pungent, and somewhat resembling that of the caraway; these properties are chiefly derived from its essential oil. The fruit (seed) should be chosen of a fresh and bright brownish colour, heavy, and possessing its peculiar aromatic odour uninjured.

Oleum Anethi, *Oil of Dill*, is obtained from the above by distillation with water; its colour is pale yellow, its odour is penetrating, resembling that of the fruit, and its taste is both acrid and sweetish. Its specific gravity is 0·881. It requires 1500 parts of water for solution, but is very soluble in alcohol and in ether.

Adulterations and Tests.—See NOTE at the end of this Section.

Pharmacopœia Preparation.—Aqua Anethi.

Medicinal Uses.—Carminative. The fruit may be given in doses of gr. x. to ʒj. Of Dill Water the dose is f℥ss. to f℥iij.

AQUA CARUI.

Caraway Water.

Aqua Seminum Carui, P.L. 1746.
Aqua Carui, P.L. 1809, P.L. 1824, P.L. 1836.

Prepare this by the same method which is directed for DILL WATER.

Remarks.—CARAWAY SEEDS, as the fruit of the caraway is commonly called, are the produce of a plant belonging to the natural family *Umbelliferæ*, grown in this country, and are also imported from Germany. They are of a brown colour, have an aromatic smell, and a warm spicy taste; their aromatic properties depend upon the oils and resin they contain.

The active constituents of Caraways, according to Trommsdorf, are a volatile oil, a green oil, resin, and tannic acid.

Pharmacopœia Preparations.—Aqua Carui, Confectio Opii, Confectio Rutæ, Emplastrum Cumini, Tinctura Cardamomi Composita, Tinctura Sennæ Composita.

Oil of Caraway.—This is obtained by distilling caraways with water. It is very fluid, and yellowish in colour when fresh, but becomes rapidly brown; its odour and taste are aromatic and penetrating. Its specific gravity is 0·938. It is composed of

Carbon	86·19
Hydrogen	10·68
Oxygen	3·13
	100·

When submitted to re-distillation, this is separable into at least two oils of different properties and composition. It probably consists of an oxygenated oil combined with the hydrocarbon $C^5 H^4$.

Adulterations and Tests.—See Note at the end of this Section.

Pharmacopœia Preparations.—Aqua Carui, Confectio Scammonii, Pilulæ Aloes Compositæ, Pilulæ Rhei Compositæ, Spiritus Carui, Spiritus Juniperi Compositus.

Medicinal Use.—Caraway is rarely given in substance; but, as well as the oil, it is employed as an aromatic adjunct or corrective to other medicines, to prevent nausea or griping.

Dose.—Of Caraway Water, f℥j. to f℥iv.; of the fruit in powder, gr. x. to ʒij.; of the Oil, ♏j. to ♏x.

AQUA CINNAMOMI.

Cinnamon Water.

Aqua Cinnamomi Tenuis, P.L. 1721.
Aqua Cinnamomi Simplex, P.L. 1746.
Aqua Cinnamomi, P.L. 1788, P.L. 1809, P.L. 1824, P.L. 1836.

See Aqua Carui.

Remarks.—CINNAMON is the bark of the *Cinnamomum Zeylanicum* of NEES, *Laurus Cinnamomum* of LINNÆUS, belonging to the natural family *Lauraceæ*, which is cultivated in Ceylon and Java.

Properties.—The best cinnamon occurs in long quills, smooth, thin, and of a bright brown colour, possessing an agreeable smell, and pleasant warm, sweet, aromatic taste; it consists of volatile oil, an aromatic resin, colouring matter, extractive, gum, starch, albumen, salts of lime and potash, tannic acid, and ligneous fibre.

Adulterations and Tests.—*Cassia-lignea* is frequently sold for cinnamon, but this bark is coarser both in appearance and flavour than true cinnamon. Dr. Pereira states that these can be distinguished from each other by solution of iodine, which strikes a blue colour with a decoction of the former, but not in a decoction of cinnamon.

Pharmacopœia Preparations.—Aqua Cinnamomi, Confectio Aromatica, Infusum Catechu Compositum, Pulvis Cinnamomi Compositus, Pulvis Kino Compositus, Spiritus Ammoniæ Aromaticus, Tinctura Cardamomi Composita, Tinctura Catechu Composita, Tinctura Cinnamomi, and Cinnamomi Composita, Tinctura Lavandulæ Composita and Vinum Opii.

Oil of Cinnamon, upon which the virtues of the bark chiefly depend, is obtained by distilling the bark with sea-water or brine; it varies in colour from yellow to brownish-red; it is heavier than water, its specific gravity being about 1·008, and consists of two oils, one lighter and one heavier than water. Oil of cinnamon has been most carefully investigated by several chemists. It forms a combination with nitric acid, from which a fragrant straw-coloured oil is again separated by the action of hot water; this consists of

Eighteen equivalents	of Carbon . .	6×18=	108	or	81·81
Eight ,,	of Hydrogen	1× 8=	8	,,	6·06
Two ,,	of Oxygen . .	8× 2=	16	,,	12·13
	Equivalent		132.		100·

Formula. . . . . . $C^{18} H^{8} O^{2}$.

and may be regarded as purified oil of cinnamon; it has been termed *hydrated oxide of Cinnamyl*, a hypothetical base $C^{18} H^{7}$, which, when combined with three eqs. of oxygen and one eq. of water, forms *Cinnamic Acid*, a substance frequently deposited from old oil of cinnamon. It occurs in brilliant pearly or prismatic crystals, sparingly soluble in cold water, but very soluble in rectified spirit. Several other products have been obtained from oil of cinnamon.

Adulterations and Tests.—Oil of Cassia is frequently used as an adulterant of oil of cinnamon. There is no satisfactory test to detect the fraud except delicacy of scent and flavour, both of which are impaired by admixture with oil of Cassia. See **Note** at the end of this Section.

Pharmacopœia Preparations.—Aqua Cinnamomi, Mistura Spiritus Vini Gallici, Spiritus Cinnamomi.

Pharmacopœia Preparations of Cinnamon Water.—Mistura Cretæ, Mistura Guaiaci, Mistura Spiritus Vini Gallici.

Dose.—Of the powdered bark, gr. x. to ʒss.; of the Oil, ♏j. to ♏iij.; of Cinnamon Water, *ad libitum* as a vehicle for other medicine.

AQUA MENTHÆ PIPERITÆ.

Peppermint Water.

Aqua Menthæ Piperitidis Simplex, P.L. 1746.
Aqua Menthæ Piperitidis, P.L. 1788.
Aqua Menthæ Piperitæ, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Peppermint, dried, two pounds,
Water two gallons.

Let a gallon distil. If the fresh herb be employed twice the weight is to be used.

This Water can be more quickly prepared from Oil of Peppermint by the same method as Dill Water.

Remarks.—This plant belonging to the natural family *Labiatæ,* is found in many parts of the world, and is extensively cultivated in this country for the oil it affords. For this purpose the entire herb is employed, being cut whilst in bloom, and at once distilled; both the quantity and quality of the oil obtained differ considerably according to the favourableness, or the contrary, of the season.

Properties of the Oil.—It is almost colourless; of a hot aromatic peculiar taste, and powerfully fragrant smell resembling that of the plant. This oil has been examined and carefully analysed by several chemists; its specific gravity is 0·902 to 0·920;

it consists of a mixture of a solid crystallizable substance, *stearopten*, held in solution by a liquid oil, *elaopten*, which are isomeric, consisting of

Twenty-one equivalents	of Carbon. . . .	6×21=126	or 77·76
Twenty ,,	of Hydrogen. .	1×20= 20	,, 12·34
Two ,,	of Oxygen. . . .	8× 2= 16	,, 9·90
		162	100·

Formula. . . . . $C^{21} H^{20} O^{2}$.

Sir R. Kane has proposed to denominate the stearoptens of the Essential oils the *camphors* of the respective plants, and the elaoptens simply *oils*. Peppermint camphor fuses at 91°, and boils at 406°; by the action of various reagents it yields several compounds; thus glacial phosphoric acid, or sulphuric acid, gives rise to a hydrocarbon, *Menthene* $C^{21} H^{18}$, which acted on by nitric acid and chlorine respectively, yields an oxide of menthene $C^{21} H^{18} O^{9}$, and a chloride of menthene $C^{21} H^{18} Cl^{5}$. Peppermint *oil*, by the action of hydrate of potash, like the camphor with the acid, yields a hydrocarbon.

Adulterations and Tests.—See NOTE at the end of this Section.

Pharmacopœia Preparations.—Of the Oil, Aqua Menthæ Piperitæ, Spiritus Menthæ Piperitæ.

Medicinal Uses.—As an aromatic stimulant in heartburn and flatulent colic. *Dose*, of the Oil, ♏ij. to ♏v. on sugar; of the Water, f℥j. to f℥iij.

AQUA MENTHÆ VIRIDIS.

Spearmint Water.

Aqua Menthæ Vulgaris Simplex, P.L. 1746.
Aqua Menthæ Sativæ, P.L. 1788.
Aqua Menthæ Viridis, P.L. 1809, P.L. 1824, P.L. 1836.

Prepare this in the same manner as directed for PEPPERMINT WATER.

Remarks.—SPEARMINT is also ranged under the natural family *Labiatæ*; it has a powerful and singular, almost disagreeable, smell, and warm aromatic bitterish taste. It is indigenous, but is cultivated like Peppermint, and subjected to distillation for its essential oil.

Properties of the Oil.—The oil resembles the plant both in taste and smell. It is of a yellowish colour when fresh distilled, becoming darker by keeping. It resembles oil of peppermint in most of its characteristics, and consists of both *camphor* and *oil.* Its specific gravity is 0·914, and its composition, according to Kane, may be represented by the formula $C^{35} H^{28} O$.

Adulterations and Tests.—See NOTE at the end of this Section.

Pharmacopœia Preparations of the Oil.—Aqua Menthæ Viridis, Spiritus Menthæ Viridis.

Medicinal Uses.—Its uses are similar to those of Peppermint, but it is less powerful. *Dose,* of the Oil, ♏ij. to ♏v.; of the Water, f℥j. to f℥iij.

AQUA PIMENTÆ.

Pimenta Water.

Aqua Piperis Jamaicensis, P.L. 1746.
Aqua Pimento, P.L. 1788.
Aqua Pimentæ, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Pimenta, bruised, a pound,
Water two gallons;
Let a gallon distil.

This Water can be more quickly prepared from Oil of Pimenta by the same method as DILL WATER.

Remarks.—PIMENTA (Allspice) is the unripe fruit of the *Eugenia Pimenta,* a tree which is indigenous to the West India Islands and South America, and which belongs to the natural family *Myrtaceæ.* Pimenta, as met with in commerce, consists of round, rough, blackish-brown berries; the brighter, smaller, and more aromatic they are the better. The taste of Pimenta is warm, spicy and aromatic; and its smell resembles a mixture of other spices, whence its vulgar name; these properties are principally owing to a volatile oil which occurs in larger quantity in the husk than in the kernel. According to an analysis cited by Berzelius, Pimenta contains

	In the shell.	In the kernels.
Volatile oil	10·0	5·0
Soft green resin	8·0	2·5
Concrete fixed oil	·9	1·2
Extract, gum, sugar, vegetable acids, ashes and moisture	29·5	73·5
Ligneous matter and loss	51·6	17·8
	100·	100·

Properties of the Oil.—This oil, obtained by distilling the berries with water, possesses a specific gravity of about 1·020, is of a reddish yellow colour, and resembles the spice in both taste and smell. It can be separated by distillation with solution of potash into two oils, the lighter of which comes over, the heavier remaining combined with the potash in the retort, from which it can again be obtained by first saturating with an acid and then distilling afresh. These do not appear to have been yet examined.

Adulterations and Tests of the Oil.—See NOTE at the end of this Section.

Pharmacopœia Preparations of the Oil.—Aqua Pimentæ, Spiritus Pimentæ.

Medicinal Uses.—As a stomachic to relieve flatulency, to prevent the griping of purgatives, and generally as an aromatic stimulant. *Dose*, of the Powder, gr.x. to xx.; of the Oil, ♏ij. to ♏vj.; of the Water, f℥j. to f℥ij.

AQUA PULEGII.

Pennyroyal Water.

Aqua Pulegii Simplex, P.L. 1746.
Aqua Pulegii, P.L. 1788, P.L. 1809, P.L. 1824.
Aqua Menthæ Pulegii, P.L. 1836.

Prepare this in the same way that PEPPERMINT WATER is directed to be made.

Remarks.—Like the other Mints this plant belongs to the natural family *Labiatæ*. It is indigenous, but is generally cultivated for medicinal purposes. Its properties are very similar to those of Peppermint and Spearmint. When the herb in bloom is distilled with water it yields a volatile oil.

Properties of the Oil.—Of a pale yellowish colour, in taste and smell resembling the herb; it boils at 395°, has a specific gravity of 0·925, and consists of

Ten equivalents of Carbon....	6×10=60	or	79·0
Eight ,, of Hydrogen..	1× 8= 8	,,	10·5
One ,, of Oxygen............	8	,,	10·5
	76.		100·

Formula...... $C^{10} H^{8} O$.

Adulterations and Tests of the Oil.—See NOTE at the end of this Section.

Pharmacopœia Preparations of the Oil.—Aqua Pulegii, Spiritus Pulegii.

Medicinal Uses.—The same as Peppermint, but it is not often employed as its flavour is disagreeable. Dose, of the Oil, ♏ij. to ♏v.; of the Water, f℥j. to f℥iij.

AQUA ROSÆ.

Rose Water.

Aqua Rosarum Damascenarum, P.L. 1721, P.L. 1746.
Aqua Rosæ, P.L. 1788, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Damask Roses ten pounds,
Water two gallons;
Let a gallon distil.

Remarks.—The ROSE belongs, and gives its name to the natural family *Rosaceæ.* The petals of the flowers, grown in this country and distilled with water, produce Rose Water, which during distillation carries over with it an opaque white concrete oil which possesses but little scent.

Properties of the Oil.—Oil of Roses (Atar or Otto) is imported from China, the East Indies, and the Levant; the oil procurable from roses cultivated in this country possessing but a faint odour in comparison to the imported oil. At ordinary temperatures *Atar* occurs as a partially crystalline mass, usually of a pale greenish yellow colour, melts at 77°, possessing, especially when diffused by solution in spirit, the delightful and characteristic perfume of the rose. It boils at 550°. It has been analysed with various results, owing probably to variation in the proportion of the *oil* and *camphor* existing in the different specimens examined. When three times its weight of rectified spirit is added to Atar, the camphor contained in it is precipitated, this dissolved in ether and again precipitated by alcohol may be washed with spirit until it has entirely lost all scent, from which it would appear that the perfume essentially resides in the *oil*. This camphor fuses at 95°, at 77° resembles the fatty concrete oil above-mentioned, and boils between 530° and 570°. It is a simple hydrocarbon, consisting of

One equivalent of Carbon	6	or	85·72
One „ of Hydrogen	1	„	14·28
Equivalent......	7.		100·

Formula...... CH.

Adulteration and Tests of the Oil.—Atar of Roses, on account of its high value, is much exposed to adulteration. Other cheaper volatile oils, such as oil of geranium, oil of rose-wood, and sandal-wood oil are said to be employed for this purpose, together with spermaceti to counterfeit the concrete oil. It ought, after being melted and again *slowly cooled*, *whilst at rest*, to remain as it were *transparent*, and the crystals of the camphor should resemble long thin blades of ice, and reflect prismatic colours. If adulterated with spermaceti, the crystals will be acicular and semi-opaque. When a few drops of real atar are mixed with the same quantity of oil of vitriol, it retains its purity of odour; most other essential oils are quickly acted upon by the sulphuric acid, and their scent impaired; its specific gravity generally is about 0·832, but this test cannot be relied on. See NOTE at the end of this Section.

Pharmacopœia Preparations.—Of the Petals, Aqua Rosæ, Syrupus Rosæ.

Medicinal Uses.—Of the water, as an agreeable vehicle for collyria, &c.

AQUA SAMBUCI.

Elder Water.

Aqua Florum Sambuci, P.L. 1721.
Aqua Sambuci, P.L. 1836.

Take of Elder Flowers ten pounds,
Water two gallons;
Let a gallon distil.

Remarks.—The ELDER (*Sambucus niger*) is a very common small indigenous tree belonging to the natural family *Caprifoliaceæ*; the flowers of which, by distillation with water, yield a small quantity of concrete oil, respecting the properties and composition of which but little is known. The *oil of elder* sold in shops, Dr. Pereira states is rape-oil coloured by spinach or elder leaves.

Pharmacopœia Preparations.—The flower is the only officinal portion of the tree now inserted in the Pharmacopœia; it is used in making Aqua Sambuci and Unguentum Sambuci.

Medicinal Use.—Elder water is slightly stimulant.

NOTE.—The properties of medicinal distilled waters are entirely owing to small portions of the various volatile or essential oils which they contain, all these oils being slightly soluble in water. Most essential oils, all the officinal, pre-exist in the plant from which they are obtained. By absorbing oxygen some of these oils form Acids (see Aqua Cinnamomi), but the greater number form Resins, as is the case with oil of turpentine, which may be regarded as their type. Several essential oils, as the oils of Copaiva, Cubebs, Bergamot, Lemon, Juniper, Savine, &c., are isomeric with oil of turpentine, all consisting of

Five equivalents of Carbon	. . 6 × 5 =	30	or 88·24
Four „ of Hydrogen	1 × 4 =	4	„ 11·76
		34	100·

whilst the oils containing oxygen may be regarded as oxides of this radical. Although all essential oils may be regarded as modifications of $C^5 H^4$, yet this formula does not indicate their equivalent numbers in each case, these equivalents being multiples of $C^5 H^4$; thus the eq. of oil of turpentine is $C^{20} H^{16}$ = four times $C^5 H^4$, oil of cubebs $C^{15} H^{12}$ = thrice $C^5 H^4$, whilst $C^{10} H^8$ or twice $C^5 H^4$, is the equivalent of some others. It has been already observed that most essential oils consist of two oils, one lighter and one heavier than water, or one liquid and one solid at common temperatures, and these occur in differing proportions in different specimens of the oil, so that the specific gravities of two specimens of the same oil, if the growth of different years or districts, are seldom identical, and thus a generally excellent test of the purity of liquids fails us in this instance; whilst owing to the high price of many of these oils, fraudulent adulteration is probably extensively practised. To avoid this, it is advisable either to prepare these oils at home, which is seldom possible, or at any rate to obtain them only from well-known and respectable sources, as I remarked with regard to the vegetable alkaloids; as all tests of their purity are somewhat doubtful. Some specific adulterations and tests have already been noticed. I shall therefore now speak generally of

Adulterations and Tests.—Alcohol, if added to an essential oil, will, on the addition of a few fragments of chloride of calcium to the suspected liquid, either dissolve them, or if present in very small quantity, act on and round the sharp edges of the fragments. If potassium is rapidly acted upon and dissolved, say in two or three minutes, the oil probably contains alcohol. On the addition of water to an essential oil thus adulterated it becomes milky. The addition of a fixed oil, as oil of almonds, will also detect alcohol, the fixed will dissolve the essential oil, but not the alcohol. By dropping some of the suspected oil on blotting-paper and exposure to the air, the difference of scent, at some period of the spontaneous evaporation of the essential oil, especially towards the end, will often point out the adulterant. If oil of turpentine has been used as the adulterant, the sophisticated oil treated with spirit (sp. gr. 0·84) will leave a portion undissolved, which is oil of turpentine, it being insoluble in spirit of that specific gravity. In most cases, excepting in oil of thyme and rosemary, for instance, if an oil sophisticated with oil of turpentine be mixed with its own bulk of poppy oil it will remain transparent, but if it be free from this adulterant, it will become of a milky white. These appear to be some of the best tests which have yet been discovered to detect the falsification of these products, but they are at the best somewhat doubtful.

CATAPLASMATA.

CATAPLASMS.

CATAPLASMA CARBONIS.

Cataplasm of Charcoal.

Take of Boiling Water ten fluidounces,
Bread two ounces,
Powdered Linseed ten drachms,
Powdered Charcoal three drachms;

Steep the bread for a short time in the water near a fire; then mix, and gradually add the Linseed, stirring so as to make a smooth Cataplasm. Mix with this two drachms of the Charcoal, and sprinkle what remains on the surface.

Remarks.—This preparation did not occur in the last Pharmacopœia. CHARCOAL is the most common and familiar form of the important elementary body *Carbon*, which exists in the diamond, in both its purest and rarest form.

Wood charcoal is prepared in different modes, according to the uses to which it is to be applied. When required merely for combustion, the branches of trees or billets of wood are made into a pile, which is covered by turf and earth, several holes being left at the bottom, and one at the top, to allow of the entry and exit of air; when the heap has been thoroughly fired, these holes are stopped up, and by the very slow combustion which then goes on, the volatile parts of the wood are vaporized, and the charcoal remains.

When, on the other hand, charcoal is produced principally for the sake of its concomitant products, the wood is heated in iron cylinders, and the volatile substances are condensed and collected; these consist of water, tar, acetic acid, usually called pyroligneous acid, pyroxylic spirit, &c.

Properties.—Charcoal is black, inodorous, insipid, brittle, easily reduced to powder, insoluble, infusible, not volatilizable, and unalterable in the air. Its texture and density chiefly depend upon those of the wood from which it is obtained; it is a bad conductor of heat, but a good one of electricity. It possesses the property of condensing aëriform bodies to which it is exposed, the quantity varying according to the gas, from less than twice up to ninety times its volume: it is to this property that its deodorizing qualities are to be attributed; it has, like animal charcoal, but in a much less degree, the power of decolorizing various substances.

Charcoal, or *Carbon*, combines with several elementary bodies, forming numerous and highly important compounds; thus with oxygen it forms

Carbonic Oxide, consisting of

One equivalent of Carbon	6
One ,, of Oxygen	8
Equivalent......	14

Formula...... CO.

Oxalic Acid, consisting of

Two equivalents of Carbon	$6 \times 2 =$	12
Three ,, of Oxygen	$8 \times 3 =$	24
Equivalent......		36

Formula...... C^2O^3.

Carbonic Acid, consisting of

One equivalent of Carbon		6
Two ,, of Oxygen..........	$8 \times 2 =$	16
Equivalent......		22

Formula...... CO^2.

With hydrogen, Carbon gives rise to many gaseous, liquid, and solid compounds of vast importance in the arts, and for the purposes of life. Charcoal exists in no less than three *Allotropic* conditions, a term importing difference of physical characteristics, for example, either the specific gravity, colour, crystalline form, &c., varying in each condition, yet co-existing with identity of chemical nature and composition; this is also the case with sulphur and phosphorus, and probably other elementary bodies.

Pharmacopœia Preparations.—The Cataplasma Carbonis is the only instance in which charcoal is employed.

Medicinal Uses.—It has been stated to be febrifuge, antiseptic, cathartic, and antelminthic, internally applied in doses from ten grains to a tablespoonful; it is however but little, if at all, now so employed. The powder, mixed with a linseed poultice, is applied to foul ulcers to destroy their smell.

CATAPLASMA CONII.

Hemlock Cataplasm.

Take of Boiling Water ten fluidounces,
Powdered Linseed four and a half ounces, or as much as may be sufficient,
Extract of Conium an ounce;

Add the Linseed gradually to the water, constantly stirring to make a Cataplasm. Spread the Extract, first softened with water, upon this.

Remarks.—See *Extractum Conii.*

Medicinal Uses.—In cancerous and irritable sores, and tender or scrofulous glandular swellings.

CATAPLASMA FERMENTI.

Cataplasm of Yest.

Cataplasma Fermenti, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Yest of Beer,
Water heated to one hundred degrees, each five fluidounces,
Flour a pound;

Mix the Yest with the water, and add the Flour, stirring so as to make a Cataplasm. Place this near a stove until it rises.

Remarks.—The nature of YEST has been warmly disputed; by some it is considered to be a plant, the *Torula Cerevisiæ* of Turpin, belonging to the natural order *Fungi*, but it is most probably a modification of gluten. It has been repeatedly analysed, and consists of two substances, one soluble in weak solution of potash, and rich in nitrogen, the other insoluble in weak potash, and destitute of nitrogen. Wheaten flour is too well known to require a lengthened description; it consists of starch, gluten, sugar, gum, bran of wheat, and water, in variable proportions.

Gluten, the nitrogenized constituent of wheat, is composed of several compounds, for further information respecting which, as well as respecting Yest, I refer to chemical authors.

Medicinal Uses.—This cataplasm is applied to painful and foul ulcers, and it is stated that it diminishes the fœtor of the discharge and hastens the sloughing of the sores. Its efficacy is supposed to depend upon the carbonic acid gas evolved during the fermentation occasioned by the yest.

CATAPLASMA LINI.

Cataplasm of Linseed.

Cataplasma Lini, P.L. 1836.

Take of Boiling Water ten fluidounces,
Powdered Linseed four ounces and a half, or as much as may be sufficient;
Add the Linseed gradually to the Water, stirring constantly, so as to make a Cataplasm.

Remarks.—LINSEED is obtained from an indigenous plant belonging to the natural family *Linaceæ*, which is extensively cultivated both for its fibre, *flax*, and for its seed, *linseed*; the latter yields an oil by pressure, which is largely employed in various trades. The residue after expression, *oil-cake*, is used for fattening cattle. The seed contains about one-fourth of its weight of oil, the specific gravity of which is about 0·94; it does not congeal unless exposed to very low temperatures, and is very slightly soluble in hot alcohol or ether; the former of which has been recommended to detect adulteration by the addition of common resin, which is very soluble in spirit. Linseed oil, according to Saussure, is composed of

Carbon	76·01
Hydrogen	11·35
Oxygen	12·64
	100·

This oil saponifies with difficulty.

Pharmacopœia Preparations of the Seed.—It is the basis of most cataplasms. Infusum Lini Compositum.

Medicinal Uses of the Seed.—Demulcent: see Infusum Lini Compositum, and for cataplasms. *Of the Oil.*—Mixed with Lime-water, as an application to scalds and burns.

CATAPLASMA SINAPIS.

Cataplasm of Mustard.

Cataplasma Sinapeos, P.L. 1788.
Cataplasma Sinapis, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Boiling Water ten fluidounces,
Powdered Linseed,
Powdered Mustard, of each two ounces and a half, or as much as may be sufficient;

Add the Powders, previously mixed together, gradually to the Water, stirring to make a Cataplasm.

Remarks.—The Vinegar directed in the former Pharmacopœia is now omitted; it was useless, if not injurious to the excitant effects of the mustard.

Mustard is an indigenous plant of the natural family *Cruciferæ*; both varieties, the black and the white, are cultivated in this country, for preparing that extensively used condiment *Flour of Mustard*, which is at the best the flour of the seed mixed with wheaten flour, powdered capsicums, and turmeric; and at the worst wholly destitute of mustard flour, consisting of the damaged flour of cereals, &c., coloured by turmeric, and rendered stinging by capsicum and euphorbium. Mustard seed, according to Pelouze, consists of an essential and fixed oil, a yellow colouring matter, albumen (*myrosin*), a crystallizable colouring matter (*sinapisin*), malate and citrate of lime, sulphocyanide of calcium, and free sulphur. When the seeds of black mustard are distilled or mixed with warm water, by the mutual action of some of the constituents of the seed, a volatile oil is produced, to which the properties of *mustard* must be chiefly ascribed; this oil has a most pungent taste and smell, and is irritable to the eyes; its specific gravity is 1·035; it is apparently identical with the oils obtained from garlic, assafœtida, and horseradish, and consists of

Eight equivalents	of Carbon	$6 \times 8 = 48$
Five „	of Hydrogen	$1 \times 5 = 5$
One „	of Nitrogen	14
Two „	of Sulphur	$16 \times 2 = 32$
		99

Formula...... $C^{8} H^{5} N S^{2}$.

Pharmacopœia Preparations.—Cataplasma Sinapis, Infusum Armoraciæ Compositum.

Medicinal Use of the Cataplasm.—Stimulant and rubefacient; applied spread on cloth to the soles of the feet in the low stage of typhus fever, when stupor or delirium is present. It is also used in the same way in apoplexy and coma, and other cases in which there is great determination to the head.

CATAPLASMA SODÆ CHLORINATÆ.

Cataplasm of Chlorinated Soda.

Take of Boiling Water six fluidounces,
Powdered Linseed four ounces and a half,
Solution of Chlorinated Soda two fluidounces;

Add the Linseed gradually to the Water, constantly stirring; then mix in the Chlorinated Soda.

Remarks.—This cataplasm is now inserted for the first time in the Pharmacopœia. For the properties of Chlorinated Soda, see *Liquor Sodæ Chlorinatæ.*

Medicinal Use.—It is recommended to be applied to sores which secrete matter possessing very offensive odour.

CERATA.

CERATES.

CERATUM.

Cerate.

Ceratum, P.L. 1809.
Ceratum Simplex, P.L. 1809, edit, alt., P.L. 1824.
Ceratum, P.L. 1836.

Take of Wax twenty ounces,
Olive Oil a pint;
Add the Oil to the melted Wax and mix.

Remarks.—WAX is secreted by bees (*Apis Mellifica*) to form the honey-comb, which, after the honey has been separated from it, is melted by means of hot water, separated from impurities, and poured into moulds.

Properties.—Wax is of a yellow colour differing in intensity; its odour is rather pleasant, it has scarcely any taste, devoid of lustre when broken, but when rubbed has a peculiar lustre, hence termed *waxy*; slightly translucent in thin portions, moderately hard, softens when warmed to about 85°, melts at 145°, when it becomes transparent; it burns with a bright flame; its specific gravity is about 0·962; it is insoluble in water, but soluble in the volatile and fixed oils. When heated with nitric acid Wax yields Succinic Acid.

Wax is bleached by allowing a thin stream of melted wax to flow into cold water, by which treatment it assumes almost a vermicular form, like thin wavy ribands; these bright yellow ribands, exposed to the joint action of water, air, and sunlight, gradually lose their colour, and after passing through various shades to white, at last yield, when re-melted, the "bleached wax" of the Pharmacopœia.

Composition.—Wax appears slightly to vary in composition; it consists of *Cerin*, *Margaric Acid*, and *Myricin*, which are separated from each other by boiling wax in alcohol, which dissolves the Cerin and Margaric Acid, leaving the Myricin insoluble. On cooling the Cerin separates, together with the

Margaric Acid, in acicular crystals, usually amounting to 70 per cent. of the wax employed, soluble in 16 parts of boiling alcohol, and fusing at 143°. The Margaric Acid of this may be separated from the Cerin by treatment with caustic potash, which forms a soap with the Margaric Acid, but does not act on the Cerin. This body fuses at 158°. For Margaric Acid, see below, OLIVE OIL.

Myricin, the other constituent of Wax, is scarcely acted on by boiling alcohol, is not saponified by boiling with potash, and fuses at 149°. The analyses of Ettling, since confirmed by Lewy, and subsequently by Warington and Francis, prove Cerin and Myricin to be isomeric bodies composed of

Eighteen equivalents	of Carbon	$6 \times 18 = 108$	or	80·59
Eighteen ,,	of Hydrogen	$1 \times 18 = 18$	,,	13·44
One ,,	of Oxygen	8	,,	5·97
	Equivalent	134.		100·

Formula...... $C^{18} H^{18} O$.

The *Cerotic Acid* of Mr. Brodie appears to be one of these substances slightly oxidized. Cerin and Myricin are generally represented as containing 19 instead of 18 eqs. of hydrogen, but the composition given above agrees better with the various analyses than $C^{18} H^{19} O$.

Impurities, Adulterations and Tests.—Tallow, resin, spermaceti, starch, oxide of lead, ochre, dry sulphate of soda, oxide of zinc, and sulphate of barytes, are stated to have been used as adulterants of wax; all these are readily detected, excepting the three first, of which only tallow and resin are likely to be used. To detect either of these, dip a piece of cotton wick into the suspected melted wax, and when cool, light it; if adulterated with resin, its sooty flame and peculiar smell will betray its presence; if it contain tallow, on being blown out its peculiar odour will also be manifest. I do not enumerate tests for the other substances: solution in oil of turpentine, and also melting the wax in warm water, would detect all of them, excepting the sulphate of soda, which would crystallize on cooling the concentrated aqueous solution.

Pharmacopœia Preparations of Wax.—Ceratum, Ceratum Calaminæ, Ceratum Cetacei, Ceratum Plumbi Acetatis, Ceratum Plumbi Compositum, Ceratum Resinæ, Ceratum Saponis Compositum, Emplastrum Cantharidis, Emplastrum Cumini, Emplastrum Picis, Emplastrum Potassii Iodidi, Unguentum Cetacei, Unguentum Hydrargyri Iodidi, Unguentum Hydrargyri Nitricooxidi, Unguentum Picis, Unguentum Sabinæ.

The other constituent of Cerate, OLIVE OIL, is procured from the fruit of the Olive-tree, natural family *Oleaceæ*, which is cultivated in most parts of Southern Europe. This is a transparent oil at common temperatures, and when good of a bright light golden colour, and of a pleasant flavour; of specific gravity 0·910, congealing at about 36°. When originally of the best quality, this oil may be kept a long time without turning rancid. Its uses in the arts and manufactures are very numerous, and of the highest importance. It is not a *drying* oil, but is readily saponified, making better soap than any other oil or fatty substance. Like all fixed oils, Olive oil is a compound substance, consisting of

Olein	72
Margarin	28
	100.

Olein, the principal constituent of all fixed oils which are not *drying oils*, is best procured in a state of purity from almond oil by solution in hot ether, and subsequent exposure of the solution to a very low temperature, when the margarin of the oil separates. The supernatant solution is to be heated for the ether to evaporate, when pure olein remains behind, which does not congeal at even the zero of Fahrenheit. This substance is a hydrated binoleate of glycerin, and is composed of

2 eqs. of hydrated Oleic Acid		+1 eq. of Glycerin		=Olein.	
72 eqs. of Carbon....	6×72=432	+6 eqs. of Carbon....	6×6=36	=468	or 72·33
68 ,, of Hydrogen	1×68= 68	+7 ,, of Hydrogen	1×7= 7	= 75	,, 11·60
8 ,, of Oxygen ..	8× 8= 64	+5 ,, of Oxygen ..	8×5=40	=104	,, 16·07
	564	+	83	=647	100·

Formula of Olein...... $C^{78} H^{75} O^{13}$.

Oleic Acid is obtained by saponifying olein and decomposing the alkaline oleate by an acid. It congeals into a mass of acicular crystals at about 23°. Its specific gravity is 0·898, it is tasteless and inodorous, insoluble in water, but very soluble in alcohol and in ether. It is a hydrated acid, containing one eq. of water to one eq. of anhydrous oleic acid, and consists of

Thirty-six equivalents	of Carbon	6×36=216	or 76·59
Thirty-four ,,	of Hydrogen ..	1×34= 34	,, 12·06
Four ,,	of Oxygen	8× 4= 32	,, 11·35
	Equivalent......	282.	100·

Formula...... $C^{36} H^{33} O^{3}$, HO.

Margarin, as has already been mentioned, is the solid, as Olein is the liquid constituent of Olive oil, and like olein, is a salt of Glycerin, the *bimargarate of glycerin*; it is composed of

2 eqs. of Margaric Acid		+1 eq. of Hydrate of Glycerin		=1 eq. of Margarin.	
68 eqs. of Carbon....	6×68=408	+6 eqs. of Carbon....	6×6=36	=444	or 72·31
66 ,, of Hydrogen	1×66= 66	+8 ,, of Hydrogen	1×8= 8	= 74	,, 12·05
6 ,, of Oxygen ..	8× 6= 48	+6 ,, of Oxygen ..	8×6=48	= 96	,, 15·64
	522	+	92	=614	100·

Formula...... $C^{74} H^{74} O^{12}$.

Margarin is a crystalline, tasteless, and inodorous substance, fusing at 118°, soluble both in alcohol and ether; when saponified and this compound decomposed by an acid, it yields *Margaric Acid*, which is a crystalline substance fusing at 140°, and volatilizable by heat, consisting of

Thirty-four equivalents of Carbon	6×34=204	or 75·54
Thirty-four „ of Hydrogen	1×34= 34	„ 12·58
Four „ of Oxygen	8× 4= 32	„ 11·88
Equivalent	270.	100·

Formula...... $C^{34} H^{33} O^{3}, HO$.

Glycerin, which is obtained by the saponification of the two constituents of olive oil just described, has not yet been obtained in a solid form, but occurs as a syrupy liquid, possessing a specific gravity of 1·26; it is very soluble in water and in alcohol, but insoluble in ether; it is readily decomposed by heat. It was discovered by Scheele, and termed by him *the sweet principle of oils*; it is best procured by saponifying fat or oil by hydrated oxide of lead, and the insoluble soap separated from the solution, which liquid should be treated with hydrosulphuric acid gas until all the lead held in solution is precipitated; the solution of glycerin, freed from sulphuret of lead, is now to be carefully evaporated to a thin syrup and dried *in vacuo* over sulphuric acid. It is a hydrate of glycerin, consisting of

Six equivalents of Carbon	6×6=36	or 39·13
Eight „ of Hydrogen	1×8= 8	„ 8·70
Six „ of Oxygen	8×6=48	„ 52·17
Equivalent	92.	100·

Formula...... $C^{6} H^{7} O^{5}, HO$.

For further information respecting these interesting and important substances I must refer to chemical authors, merely adding that on theoretical grounds Berzelius regarded Glycerin as the hydrated oxide of a hypothetical base, *Lipyl*, its formula being $C^{3} H^{2}$; and also that in making these remarks on the constituents of olive oil and the oily acids, I have adopted the analyses of Gottlieb.

Impurities, Adulterations, and Tests.—The cheaper kinds of seed-oils, such as poppy and rape-seed oils, are used as adulterants. Olive oil when pure completely solidifies when plunged in ice, but only partially so if it contain poppy oil. When shaken in a flask the surface of pure olive oil remains smooth, but forms a "bead" if adulterated with poppy oil. The best test appears to be Poutet's. Dissolve 120 grains of mercury in 150 grains of nitric acid, sp. gr. 1·35, and mix one part of this solution with

48 parts of the suspected oil. Shake the mixture occasionally, when if the oil be pure it will become a fatty substance in the space of four hours in cold, and of about seven hours in warm weather; in twenty-four hours it will have hardened considerably and become quite firm and solid. If the oil be adulterated it may thicken by this treatment, but will not solidify. The mercurial solution must be *recently prepared.*

Pharmacopœia Preparations of Olive Oil.—In all the Cerates before enumerated under "Wax." Emplastrum Ammoniaci cum Hydrargyro, Emplastrum Cumini, Emplastrum Hydrargyri, Emplastrum Picis, Emplastrum Plumbi, Emplastrum Potassii Iodidi, Linimentum Ammoniæ, Linimentum Ammoniæ Sesquicarbonatis, Linimentum Calcis, Linimentum Camphoræ, Unguentum Cetacei, Unguentum Elemi, Unguentum Hydrargyri Nitratis, Unguentum Picis, and Unguentum Plumbi Compositum.

Medicinal Uses, of Olive Oil, as one of the bases of the above-named preparations for Liniments; taken internally in doses of f℥j to f℥ij it acts as a gentle laxative. Cerate is used as a cooling dressing, and as a basis for more active preparations.

CERATUM CALAMINÆ.

Cerate of Calamine.

Ceratum Epuloticum, P.L. 1746.
Ceratum Lapidis Calaminaris, P.L. 1788.
Ceratum Calaminæ, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Prepared Calamine,
Wax, of each seven and a half ounces,
Olive Oil a pint;

Mix the Oil with the melted Wax, then remove from the fire, and when they begin to solidify add the Calamine, and stir constantly until they have cooled.

Remarks.—CALAMINE has now been transferred to Materia Medica. The Calamine intended to be used is the amorphous variety of Carbonate of Zinc occurring in several parts of England.

Properties.—It is of various shades of colour, as greyish, yellowish, greenish, and sometimes brown, owing to sesquioxide of iron; it is of different degrees of hardness, and according to its purity, is more or less soluble in acids, with the extrication of carbonic acid gas.

Composition.—A specimen from Derbyshire yielded by the analyses of Smithson, in 100 parts, carbonic acid 34·8, oxide of zinc 65·2.

Formula. . . . . . ZnO, CO^2.

Impurities, Adulterations, and Tests.—Dr. Brett found in various samples from 78 to 87 per cent. of sulphate of barytes; Mr. Moore analysed six samples obtained from '*the most respectable drug houses in London*,' only one of which contained any oxide of zinc, and that existing almost entirely as silicate of zinc. For Tests, see MATERIA MEDICA: *Calamina præparata.*

Pharmacopœia Preparation.—Ceratum Calaminæ.

CERATUM CANTHARIDIS.

Cerate of Cantharides.

Unguentum ad Vesicatoria, P.L. 1746.
Ceratum Cantharidis, P.L. 1788.
Ceratum Lyttæ, P.L. 1809.
Ceratum Cantharidis, P.L. 1824, P.L. 1836.

Take of Cantharides, rubbed to very fine powder, an ounce,
Cerate of Spermaceti six ounces;

Add the Cantharides to the Cerate softened by heat, and mix.

Medicinal Use.—This Cerate is employed to promote a discharge from a blistered surface; it generally answers the purpose, without exciting much irritation; but sometimes it occasions strangury, and produces swelling of the lymphatics, and general irritation.

CERATUM CETACEI.

Cerate of Spermaceti.

Ceratum Album, P.L. 1746.
Ceratum Spermatis Ceti, P.L. 1788.
Ceratum Cetacei, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Spermaceti two ounces,
White Wax eight ounces,
Olive Oil a pint;

To the Spermaceti and Wax melted together add the Oil, and stir them with a spatula until they have cooled.

Remarks.—The head of the Cachalot or Sperm-whale, a species of the family *Cetacea*, yields a mixture of spermaceti and sperm-oil, which are separated by pressure, and the spermaceti purified by boiling with a dilute solution of potash.

Properties.—Spermaceti is a colourless solid of a lamellar crystalline structure and nacreous lustre, nearly tasteless and inodorous, slightly translucent, and rather greasy to the touch. Its specific gravity is 0·943, it melts at 112°, and burns at high temperatures. It is insoluble in water, very slightly soluble in cold alcohol, and only 3·5 per cent. is taken up by the spirit when boiling, and of this about one-fourth is deposited on cooling; ether when heated dissolves a considerable quantity of it, most of which again separates on cooling; it is also dissolved when heated in the volatile and fixed oils. It has no action on vegetable colours. *Cetine* or pure spermaceti is obtained by solution in boiling alcohol, from which it separates on cooling; its properties are that it is crystalline, has a bright pearly lustre, melts at 120°, and sublimes without decomposition at 680°.

Cetine consists of

Sixteen equivalents	of Carbon	$6 \times 16 = 96$	or	80·00
Sixteen ,,	of Hydrogen	$1 \times 16 = 16$	,,	13·33
One ,,	of Oxygen	8	,,	6·67
	Equivalent	120.		100·

Formula.... $C^{16} H^{16} O$.

When Cetine is boiled with a concentrated solution of potash it gradually saponifies, yielding *Cetylic acid* and a peculiar base called *Ethal*; this latter, when distilled with glacial phosphoric acid, yields a hydrocarbon termed *Cetene*; this is a colourless oily liquid boiling at 527°, and soluble in ether and alcohol; it may be represented by the formula $C^{32} H^{32}$.

Pharmacopœia Preparations.—Ceratum Cetacei, Unguentum Cetacei.

Medicinal Uses.—Spermaceti is now rarely internally exhibited, but is still largely employed either as a cerate or an ointment.

CERATUM HYDRARGYRI COMPOSITUM.

Compound Cerate of Mercury.

Take of the Stronger Ointment of Mercury,
Compound Cerate of Soap, each six ounces,
Camphor an ounce and a half;
Rub them together.

Medicinal Use.—This is employed to promote the dispersion of indolent tumours.

CERATUM PLUMBI ACETATIS.

Cerate of Acetate of Lead.

Unguentum Saturninum, P.L. 1746.
Unguentum Cerussæ Acetatæ, P.L. 1788.
Ceratum Plumbi Superacetatis, P.L. 1809.
Ceratum Plumbi Acetatis, P.L. 1824, P.L. 1836.

Take of Acetate of Lead, powdered, five drachms,
White Wax, five ounces,
Olive Oil a pint;

Dissolve the Wax in eighteen fluidounces of the Oil; then to these gradually add the Acetate of Lead separately rubbed with the rest of the Oil, and stir with a spatula until they incorporate.

Medicinal Use.—A cooling dressing in cases of burns and excoriations.

CERATUM PLUMBI COMPOSITUM.

Compound Cerate of Lead.

Ceratum Lithargyri Acetati, P.L. 1788.
Ceratum Lithargyri Acetati Compositum, P.L. 1788, edit. alt.
Ceratum Plumbi Compositum, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Solution of Diacetate of Lead six fluidounces,
Wax eight ounces,
Olive Oil a pint,
Camphor a drachm;

Mix the melted Wax with sixteen fluidounces of the Oil; then remove from the fire, and when they begin to thicken, gradually add the Solution of Diacetate of Lead, and stir them constantly with a spatula until they have cooled; lastly, with these mix the Camphor dissolved in the rest of the Oil.

Medicinal Use.—This is commonly known by the name of *Goulard's Cerate.* It is applicable to the same cases as the preceding cerate. It is stated to be particularly serviceable in chronic ophthalmia of the tarsus, and for the increased secretion of tears, which so frequently affects the eyes of persons advanced in years.

CERATUM RESINÆ.

Cerate of Resin.

Ceratum Citrinum, P.L. 1746.
Ceratum Resinæ Flavæ, P.L. 1788.
Ceratum Resinæ, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Resin,
Wax, each fifteen ounces,
Olive Oil a pint;

Melt the Resin and Wax together by a slow fire; then add the Oil, and press the Cerate while hot, through a linen cloth.

Remarks.—The properties of Resin will be more fitly considered when we come to speak of Turpentine. See EMPLASTRUM GALBANI.

Pharmacopœia Preparation.—Unguentum Cantharidis.

Medicinal Use.—This is commonly called *Yellow Basilicon*. It is employed as an application to foul and indolent ulcers.

CERATUM SAPONIS COMPOSITUM.

Compound Cerate of Soap.

Ceratum Saponis, P.L. 1788, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Soap ten ounces,
Wax twelve ounces and a half,
Oxide of Lead, powdered, fifteen ounces,
Olive Oil a pint,
Vinegar a gallon;

Boil the Vinegar with the Oxide, over a slow fire, constantly stirring them until they incorporate; then add the Soap, and boil again in like manner, until all the moisture is evaporated; lastly, with these mix the Wax first dissolved in the Oil.

Pharmacopœia Preparation.—Ceratum Hydrargyri Compositum.

Medicinal Use.—This Cerate is occasionally used as a cooling dressing.

NOTE.—The Cerates have been in most cases altered in quantity, being all reduced to the same standard, viz. a pint of olive oil; but in no case have the proportions been changed. Ceratum Sabinæ is now called Unguentum Sabinæ, and is placed among the Ointments.

CONFECTIONES.

CONFECTIONS.

CONFECTIO AMYGDALÆ.

Confection of the Almond.

Confectio Amygdalæ, P.L. 1809.
Confectio Amygdalarum, P.L. 1809, edit. alt., P.L. 1824.
Confectio Amygdalæ, P.L. 1836.

Take of the Almond eight ounces,
Acacia, powdered, an ounce,
Sugar four ounces;

Pound the Almond first macerated in cold Water, and deprived of its skin, and rub through a fine metallic sieve; then the remainder being added, pound all together until incorporated.

This Confection will remain longer unchanged, if the Almond, previously deprived of skin and dried, and rubbed to the finest powder, be mixed with the Acacia and Sugar separately powdered, and the mixed powder kept in a covered vessel.

Remarks.—JORDAN ALMONDS are the seeds of the *Amygdalus communis,* a tree belonging to the natural family *Rosaceæ,* a native of Syria and North Africa, and cultivated in Southern Europe, particularly in Spain, the finest almonds being imported from Malaga. They are too well known to require any description of their physical characteristics. Boullay assigns the following composition to the Almond:—

Oil	54
Albumen (Emulsin)	24
Liquid sugar	6
Gum	3
Skin, moisture, fibrous matter and trace of acetic acid	13
	100

The oil is procurable by pressure from sweet almonds, but it is usually obtained, and of similar properties, from bitter almonds, the residue of which afterwards yields the essential oil. The expressed or fixed oil of almonds is very fluid, congeals at about 30°, is transparent and of a slight yellowish colour, which it loses by exposure to light; it soon becomes rancid by the action of the air; it is nearly inodorous, and has a bland oleaginous taste; its specific gravity has been stated very differently, as varying between 0·911 and 0·932; one part is soluble in 25 parts of cold and 6 parts of boiling spirit; it is also soluble in ether.

Composition.—Like olive oil, see *Ceratum*, almond oil consists of olein and margarin, but in the proportions of

Olein	76
Margarin	24
	100

Emulsin or *Synaptase* is soluble in cold water, from which solution it is precipitated by alcohol, and also by the careful addition of acetic acid, in white flocculi; when the solution is heated to 212° it coagulates. It greatly resembles vegetable albumen, but is distinguished from it by its action on *Amygdalin*, a singular substance existing in the bitter almond, by which action both essential oil of bitter almonds and hydrocyanic acid are formed. Authorities differ respecting the composition of emulsin, which however is a highly nitrogenized body analogous to vegetable albumen, casein and legumin.

Adulteration and Tests of Almond Oil.—See *Ceratum*, Olive oil. Taste and smell are about the best tests for detecting any sophistication of this oil until it becomes rancid, when it is no longer fit for medicinal use.

Pharmacopœia Preparations.—Confectio Amygdalæ, Mistura Amygdalæ.

Medicinal use of the Almond Confection.—See Mistura Amygdalæ.

CONFECTIO AROMATICA.

Aromatic Confection.

Confectio Raleighana, P.L. 1721.
Confectio Cardiaca, P.L. 1746.
Confectio Aromatica, P.L. 1788, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Cinnamon,
Nutmegs, each two ounces,
Cloves an ounce,
Cardamoms [husked] half an ounce,
Saffron two ounces,
Prepared Chalk sixteen ounces,
Sugar two pounds,
Distilled Water as much as may be sufficient;

Rub the dry ingredients together to a very fine powder and keep them in a close vessel. Whenever the Confection is to be used, add two fluidrachms of distilled water to an ounce of the powder, and mix all together until incorporated.

Medicinal Uses.—Stimulant. Cordial. Dose, gr. xx. to ʒj. or more. It is incompatible with acids, acidulous and metallic salts, on account of the carbonate of lime which it contains.

As this preparation when mixed with water is liable to ferment, and act upon the carbonate of lime, it is directed to be kept dry, and water added only when wanted.

CONFECTIO AURANTII.

Confection of Orange [Peel].

Conserva Flavedinis Aurantiorum, P.L. 1721.
Conserva Flavedinis Corticum Aurantiorum, P.L. 1746.
Conserva Corticis exterioris Aurantii Hispalensis, P.L. 1788.
Conserva Aurantii Hispalensis Corticis exterioris, P.L. 1788, edit. alt.
Confectio Aurantii, P.L. 1809.
Confectio Aurantiorum, P.L. 1809, edit. alt., P.L. 1824.
Confectio Aurantii, P.L. 1836.

Take of Orange Peel, fresh, separated by a rasp, a pound,
Sugar three pounds;

Pound the Peel in a stone mortar with a wooden pestle; then, the Sugar being added, again pound until incorporated.

CONFECTIO CASSIÆ.

Confection of Cassia.

Diacasia cum Manná, P.L. 1721.
Electarium e Casiá, P.L. 1746.
Electuarium e Cassiá, P.L. 1788.
Electuarium Cassiæ, P.L. 1788, edit. alt.
Confectio Cassiæ, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Prepared Cassia half a pound,
Manna two ounces,
Prepared Tamarind an ounce,
Syrup of Rose eight fluidounces;

Bruise the Manna, then dissolve it in the Syrup; afterwards mix in the Cassia and Tamarind, and evaporate the moisture until a proper consistence is obtained.

Remarks.—MANNA is principally obtained from the *Fraxinus rotundifolia*, which is a native of southern Europe, belonging to the natural family *Oleaceæ*. The best manna is imported from Sicily under the name of *flake manna*, occurring in pieces of from two to eight inches long, and from one to three in width, varying in thickness, uneven and rough on the surface, of a dirty straw colour, and disagreeable sweetish taste and smell. Manna varies considerably in composition; the best contains most *Mannite*, sometimes amounting to 60 per cent. of the whole; the other constituents are sugar, gum, a bitter extractive, mucilage and water.

Mannite is prepared by dissolving manna in water, decolorizing and crystallizing the solution; it is a white crystalline substance of a silky lustre and sweetish taste, but no scent, is very soluble in cold but less so in boiling water, and is also soluble in alcohol. It differs from true sugars in not being susceptible of undergoing alcoholic fermentation, although it may be procured from cane-sugar by exciting in a solution of that sugar the *mucous* or *viscous* fermentation. It likewise occurs in many sea-weeds. It may be fused without undergoing any change, possesses neither basic nor acid qualities, and yields oxalic and saccharic acids when treated with nitric acid. Mannite is composed of

Six equivalents of Carbon	6×6=36	or	39·6
Seven „ of Hydrogen	1×7= 7	„	7·7
Six „ of Oxygen..	8×6=48	„	52·7
Equivalent......	91.		100·

Formula...... $C^6 H^7 O^6$.

Adulterations, Impurities, and Tests.—Manna is but seldom adulterated; potato sugar has been used for this purpose, but the difference is too marked to succeed. Its chief constituent, mannite, is sometimes employed as an adulterant of the salts of the alkaloids.

Pharmacopœia Preparations.—Confectio Cassiæ, Syrupus Sennæ.

Medicinal Uses.—Of Manna, gently laxative, *Dose,* ʒj. to ℥j. Of Confectio Cassiæ, purgative, *Dose,* ʒij. to ℥j.

CONFECTIO OPII.

Confection of Opium.

Philonium Romanum, P.L. 1721.
Philonium Londinense, P.L. 1746.
Confectio Opiata, P.L. 1788.
Confectio Opii, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Opium, powdered, six drachms,
Long Pepper an ounce,
Ginger, powdered, two ounces,
Caraway three ounces,
Tragacanth, powdered, two drachms,
Syrup sixteen fluidounces;

Rub the dry ingredients together to a very fine powder, and keep them in a covered vessel. Whenever the Confection is to be used, gradually add the Syrup made hot, and mix.

Remarks.—I shall under this preparation describe the properties of Long Pepper, the other ingredients of this confection being treated of under their more important compounds. Long pepper is the product of a climber belonging to the natural family *Piperaceæ*, cultivated both in the East and West Indies: it is met with in cylinders of about an inch long, of a dusty brown colour, pleasant odour, and biting acrid taste. Piperin, the active principle of the peppers, was first obtained by Oerstedt from long pepper, which also yields an acrid fatty resin, volatile oil, starch, bassorin, gum, extractive, and salts of vegetable acids.

Adulterations, &c.—See Confectio Piperis.

Pharmacopœia Preparations.—Confectio Opii, Pulvis Cinnamomi Compositus, Pulvis Cretæ Compositus, Tinctura Cinnamomi Composita.

Medicinal Use, of Long Pepper. As an aromatic stimulant, Dose, gr. v. to ℈j. Of Confectio Opii, both stimulant and narcotic, Dose, gr. x. to ʒss.

CONFECTIO PIPERIS.

Confection of Pepper.

Confectio Piperis Nigri, P.L. 1824, P.L. 1836.

Take of Black Pepper,
Elecampane [Root], each a pound,
Fennel [Seeds], three pounds,
Honey, [despumated,]
Sugar, each two pounds;

Rub the dry ingredients together, to a very fine powder, and keep them in a covered vessel. Whenever the Confection is to be used, add the Honey gradually to the powder, and pound them until incorporated.

Medicinal Uses.—This preparation was inserted in the Pharmacopœia of 1824; it is probably intended as a substitute for Ward's Paste for Piles, &c. Dose, from ʒj. to ʒij. With respect to Ward's Paste, Dr. Paris observes, that "it is principally useful in those cases attended with considerable debility, in leucophlegmatic habits, and when piles arise from a deficient secretion in the rectum;" in cases attended with inflammation it does harm.

Remarks.—BLACK PEPPER is the unripe fruit of the *Piper Nigrum*, a climbing shrub, also of the natural family *Piperaceæ*, and cultivated both in the East and West Indies. It occurs in commerce as small, black, hard and heavy berries, wrinkled on the surface, of a peculiar aromatic smell and pungent spicy taste. Its proximate constituents are the same as those of long pepper, of which Piperin, the resin and the essential oil are those to which its properties are owing.

Piperin is obtained by digesting pepper in rectified spirit, evaporating the tincture to an extract, depriving this of its resin by means of a caustic alkali, and redissolving in spirit the crude piperin which remains. This solution, abandoned to spontaneous evaporation, yields rhombic prisms, generally of a straw colour, which is Piperin; when pure however it is colourless, tasteless, and inodorous, possessing neither basic nor acid properties, fusing at 212°, and reddening when acted on by nitric acid. Piperin is composed of

Thirty-four equivalents	of Carbon ..	6×34=204	or	71·58
Nineteen ,,	of Hydrogen	1×19= 19	,,	6·66
One ,,	of Nitrogen	= 14	,,	4·92
Six ,,	of Oxygen..	8× 6= 48	,,	16·84
	Equivalent....	285.		100·

Formula...... $C^{34} H^{19} N O^{6}$.

Some recent researches by Wertheim render it probable that piperin in crystals is a hydrated substance containing one eq. of water.

The Essential Oil of Pepper is limpid and colourless; its specific gravity is 0·9932, and smells but does not taste like pepper; its composition is identical with oil of turpentine.

Pepper Resin is a very pungent and acrid substance, soluble both in alcohol and ether.

Impurities, Adulterations, and Tests.—Ground pepper is extensively adulterated with ground oil-cake, linseed meal, and various other substances. Microscopic examination of the suspected drug, and comparison with the powder of a few berries, is the readiest mode of detecting sophistication. For medicinal purposes the berries, *whole pepper*, powdered should always be used.

Pharmacopœia Preparations.—Confectio Piperis, Confectio Rutæ.

Medicinal Uses.—As a stimulant in doses of gr.v. to ℈j.

ELECAMPANE is an indigenous plant belonging to the natural family *Compositæ*. The root, which is sold in slices, has an aromatic smell and bitter taste; it contains a peculiar modification of starch *Inulin*, and also *Helenin*, a camphor. Inulin when boiled with water thickens but does not gelatinize, and deposits again on cooling; it is not rendered blue by the action of iodine. *Helenin* is obtained from the root by means of boiling rectified spirit and mixing this solution with four times its bulk of water; by standing helenin deposits in dazzling white needles; like the rest of the camphors it is probably an oxide of a volatile oil.

Pharmacopœia Preparation.—Confectio Piperis.

Medicinal Uses.—Elecampane is an aromatic stimulant but little used. Dose ℈j to ʒij of the powdered root.

FENNEL is the fruit (seed) of a plant belonging to the natural family *Umbelliferæ*; it is indigenous, the seed is oval, of a brown colour, and of a characteristic smell and taste. Its properties depend upon the

Essential Oil of Fennel, a colourless or pale yellow oil, of specific gravity 0·997; it begins to congeal below 50°, and yields a *camphor* which is heavier than water, and an *oil*; these are isomeric, and consist of

Twenty equivalents	of Carbon....	$6 \times 20 = 120$	or	81·08
Twelve ,,	of Hydrogen	$1 \times 12 = 12$	,,	8·11
Two ,,	of Oxygen ..	$8 \times 2 = 16$	,,	10·81
	Equivalent......	148.		100·

Formula...... $C^{20} H^{12} O^{2}$.

This oil precisely corresponds in its chemical characteristics with oil of Anise.

For *Adulterations and Tests,* see Note at the foot of Section AQUÆ.

Pharmacopœia Preparations, of the Fruit, Confectio Piperis, Syrupus Sennæ. Of the Oil, Spiritus Juniperi Compositus.

Medicinal Use.—As a warm aromatic. Dose of the powdered fruit ʒss. to ʒj. Of the oil ♏ij. to ♏x.

CONFECTIO ROSÆ.

Confection of Rose.

Conserva Florum Rosarum Rubrarum, P.L. 1721,
P.L. 1746.
Conserva Rosæ Rubræ, P.L. 1788.
Confectio Rosæ Gallicæ, P.L. 1809, P.L. 1824,
P.L. 1836.

Take of Red Rose [petals] a pound,
Sugar three pounds;
Pound the Rose in a stone mortar; then the Sugar being added, pound them again until incorporated.

Medicinal Use.—This is principally employed as an agreeable vehicle for making up more active medicines into pills and electuaries.

CONFECTIO ROSÆ CANINÆ.

Confection of Dog Rose [Hips].

Conserva Fructûs Cynosbati, P.L. 1721, P.L. 1746.
Conserva Cynosbati, P.L. 1788.
Confectio Rosæ Caninæ, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Dog Rose, deprived of its seed, a pound,
Sugar, powdered, twenty ounces;
Rub the Rose (pulp) with the sugar gradually added, until thoroughly incorporated.

Remarks.—The Dog-rose is a common indigenous shrub belonging to the natural family *Rosaceæ*. The pulp of the fruit, Hips, has a pleasant sub-acid sweet taste, and contains malic and citric acids, sugar, gum, tannic acid, traces of both essential and fat oils, wax, resin, and many vegetable salts, besides vegetable fibre and water.

Pharmacopœia Preparation.—Confectio Rosæ Caninæ.

Medicinal Use.—This confection is employed for the same purposes as the last, and as the basis of a cough linctus.

CONFECTIO RUTÆ.

Confection of Rue.

Electuarium e Baccis Lauri, P.L. 1721, P.L. 1746.
Confectio Rutæ, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Fresh Rue,
Caraway,
Bay, each an ounce and a half.
Prepared Sagapenum half an ounce,
Black Pepper two drachms,
Honey [despumated,] sixteen ounces;
Distilled Water, as much as may be sufficient;

Rub the dry ingredients together to very fine powder, then the Sagapenum and Honey being dissolved in water, over a slow fire, add the powder gradually, and mix all together.

Medicinal Use.—This Confection is employed as an antispasmodic in enemas only.

Remarks.—Rue is a shrub belonging to the natural family *Rutaceæ*, of a strong unpleasant smell, and bitter acrid taste; its medicinal properties depend on an essential oil and a bitter extractive.

Oil of Rue is of a full yellow colour, of specific gravity 0·837 to 0·91, boiling at 451°, containing two isomeric bodies, an oil and a camphor, consisting of

Twenty-eight equivalents	of Carbon..	$6\times28=$	168	or 76·34
Twenty-eight „	of Hydrogen	$1\times28=$	28	„ 12·73
Three „	of Oxygen	$8\times3=$	24	„ 10·93
		Equivalent......	220.	100·

Formula...... $C^{28} H^{28} O^{3}$.

Dr. Wagner has formed an artificial oil of rue, by treating Cod-liver and other fish oils with sulphuric acid and an alkali.

Adulterations, &c.—See Note at the end of the Section Aquæ.

Pharmacopœia Preparation.—Confectio Rutæ.

The Bay is a shrubby tree of the natural family *Lauraceæ*, both the leaves and berries of which have a peculiar but very agreeable smell and taste. The berries contain both fixed and volatile oils, the former in large quantity; it is a fat oil of a greenish colour, soluble in ether, and saponifying with alkalis. The essential oil is of a pale yellow colour.

Pharmacopœia Preparations.—Confectio Rutæ, Emplastrum Cumini.

CONFECTIO SCAMMONII.

Confection of Scammony.

Electuarium Caryocostinum, P.L. 1721.
Electarium e Scammonio, P.L. 1746.
Electuarium e Scammonio, P.L. 1788.
Electuarium Scammonii, P.L. 1788, edit. alt.
Confectio Scammonii, P.L. 1809.
Confectio Scammoneæ, P.L. 1809, edit. alt., P.L. 1824.
Confectio Scammonii, P.L. 1836.

Take of Scammony, powdered, an ounce and a half,
Clove, bruised,
Ginger, powdered, each six drachms,
Oil of Caraway half a fluidrachm,
Syrup of Rose, as much as may be sufficient;

Rub the dry ingredients together to very fine powder, and preserve them in a covered vessel; then, whenever the Confection is to be used, the Syrup being poured in, rub again; lastly, the Oil being added, mix them all together.

Medicinal Use.—This is a stimulating cathartic, and may be given in the dose of ʒss. to ʒj. It is but seldom used.

CONFECTIO SENNÆ.

Confection of Senna.

Electuarium Lenitivum, P.L. 1721.
Electarium Lenitivum, P.L. 1746.
Electuarium e Sennâ, P.L. 1788.
Electuarium Sennæ, P.L. 1788, edit. alt.
Confectio Sennæ, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Senna eight ounces,
Figs a pound,
Prepared Tamarind,
Prepared Cassia,
Prepared Prune, each half a pound,
Coriander four ounces,
Fresh Liquorice, powdered, three ounces,
Sugar two pounds and a half,
Distilled Water three pints;

Rub the Senna with the Coriander, and by a sieve separate ten ounces of the mixed powder. Then the Figs and the Liquorice being added to the Water, boil down to one half; afterwards press out [the liquor] and strain it. Evaporate the strained liquor in a water-bath, until of the whole, twenty-four fluidounces remain; then, the Sugar being added, let a Syrup be made. Mix in with this the Tamarind, Cassia, and Prune, and a short time before they have cooled, add gradually the sifted powder, stirring constantly with a spatula, until thoroughly incorporated.

Remarks.—Both figs and prunes contain much sugar, especially the former, and are gently laxative. The coriander is an umbelliferous plant, the fruit (seed) of which has a most agreeable warm aromatic taste and scent.

Medicinal Use.—This is much employed as a laxative, but is often very badly prepared, containing neither senna nor cassia, and is sold for one third the price which the genuine preparation costs. Dose, ʒij. or more.

DECOCTA.

DECOCTIONS.

Decoctions differ from hot infusions only in the application of a longer-continued heat; by this the solvent power of the water is increased, and some substances which are sparingly dissolved by mere infusion in hot water, are more thoroughly extracted by boiling in it.

In some cases, however, infusions contain more of the active principle of medicines than decoctions; thus aromatics and substances which contain essential oils, are diminished in power by their volatilization during the long-continued action of the heat. Another circumstance to be noticed is this; that some of the principles, which are dissolved by hot water, are deposited as the solution cools; this is particularly the case with cinchona, and therefore this decoction should always be exhibited turbid, from the suspension of particles which have become insoluble by cooling. Decoctions ought always to be strained hot, for the reasons which have been just stated, and they should be prepared with distilled water; spring water which has been long boiled should be especially avoided.

Decoctions, like infusions, suffer decomposition by being kept; consequently they should be prepared only a very few hours before they are used.

DECOCTUM ALOES COMPOSITUM.

Compound Decoction of Aloes.

Decoctum Aloës Compositum, P.L. 1809, P.L· 1824, P.L. 1836.

Take of Extract of Liquorice seven drachms,
Carbonate of Potash a drachm,
Extract of Aloes,
Myrrh, powdered,
Saffron, each a drachm and a half,
Compound Tincture of Cardamom seven fluidounces,
Distilled Water a pint and a half;

Boil down the Liquorice, Carbonate, Aloes, Myrrh, and Saffron in the Water, to a pint, and strain; then add the Tincture.

Incompatibles.—Acids, acidulous salts, earthy and metallic salts, and all substances which are decomposed by carbonate of potash, or which decompose it.

Medicinal Uses.—Mildly cathartic. Dose, from f℥ss. to f℥j.

DECOCTUM AMYLI.

Decoction of Starch.

Mucilago Amyli, P.L. 1788, P.L. 1809, P.L. 1824.
Decoctum Amyli, P.L. 1836.

Take of Starch four drachms,
Water a pint;

Rub the Starch with the Water gradually poured in, then boil for a short time.

Remarks.—This Decoction should be prepared from White Starch, and not from that which is generally employed for domestic purposes, which is coloured by *smalts*, a powdered blue glass. It is used as a demulcent.

Pharmacopœia Preparation.—Enema Opii.

Starch or Fecula is a vegetable principle existing in grain, roots, bulbs, and other parts of plants. It is manufactured chiefly from wheat, which contains about 70 per cent. of it, and from rice; it is procured from the former by subjecting it to the acetous fermentation, and from the latter by treating it with a dilute solution of caustic soda, which acts upon the gluten and liberates the starch.

Properties.—Starch is white, nearly inodorous and insipid; when dried in mass it cracks into small columnar prismatic pieces. Examined with the microscope it is found to consist of very minute circular or spherical grains, consisting of a membranous coat, *amylin*, enclosing a transparent gummy substance *amidin*; these grains swell but remain entire in cold water, but in hot water they burst, the amidin dissolves, and the amylin swells, becomes transparent and floats. Starch undergoes no change in a dry atmosphere, it is insoluble in water below 160°, and is coagulated and becomes insoluble at 180°; between these extremes it dissolves; the solution coagulates when heated, and by exposure to the air becomes mouldy and sour; it is precipitated from solution by diacetate of lead; with solution of iodine it forms iodide of starch of a fine deep blue colour, a characteristic test of both substances; this compound appears to be soluble in pure water, but not in saline solutions, from which it is deposited as a fine blue powder; the colour disappears, temporarily, if it be heated for a short time, but long-continued boiling destroys it by expelling the iodine; the colour is also destroyed by an excess either of starch or of iodine, by acids, by alkalis, and by excess of alcohol.

When heated to between 300° and 400°, or till it assumes a brownish colour, starch becomes soluble in cold water and acquires the properties of gum, and is employed under the name of British Gum in various manufactures.

Starch is decomposed by the action of the stronger acids when concentrated, giving rise to various new compounds; when long heated in water containing a little sulphuric acid it is converted into grape-sugar, and the same effect is produced on the starch of barley by malting, and by treating starch with an infusion of malt.

Composition.—Starch consists of

Twelve equivalents of Carbon	6 × 12 =	72	or	44·44
Ten „ of Hydrogen ..	1 × 10 =	10	„	6·17
Ten „ of Oxygen	8 × 10 =	80	„	49·39
Equivalent......		162.		100·

Formula...... $C^{12} H^{10} O^{10}$.

Pharmacopœia Preparations.—Decoctum Amyli, Pulvis Tragacanthæ Compositus.

Medicinal Uses.—Of the decoction, emollient and demulcent.

DECOCTUM CETRARIÆ.

Decoction of Liverwort.

Decoctum Lichenis, P.L. 1809, P.L. 1824.
Decoctum Cetrariæ, P.L. 1836.

Take of Liverwort five drachms,
Water a pint and a half;
Boil down to a pint, and strain.

Remarks.—Liverwort or Iceland Moss belongs to the natural family *Lichenes*; it is imported from Hamburgh; it contains two varieties of starch, Cetrarin or Cetraric Acid, and Lichestearic Acid; of these the only important constituent is *Cetraric Acid,* which occurs in silky acicular crystals; it is very bitter, almost insoluble in water, but soluble in spirit and slightly so in ether, soluble in the alkalis, and yields a red colour with the persalts of iron. It consists of

Thirty-four equivalents of Carbon....	$6 \times 34 =$	204	or 60·0
Sixteen „ of Hydrogen..	$1 \times 16 =$	16	„ 4·7
Fifteen „ of Oxygen....	$8 \times 15 =$	120	„ 35·3
Equivalent......		340.	100·

Formula...... $C^{34} H^{16} O^{15}$.

This acid is readily decomposed by the joint action of air and heat, by boiling it with water or alcohol, whether in an uncombined state or existing as a salt combined with the alkalis.

Incompatibles.—The alkalis and their carbonates, most metallic salts, and iodine.

Pharmacopœia Preparation.—Decoctum Cetrariæ.

Medicinal Use.—Demulcent in chronic affections of the pulmonary and digestive organs. Dose, f℥j. to f℥iv.

DECOCTUM CHIMAPHILÆ.

Decoction of Winter Green or Pyrola.

Decoctum Chimaphilæ, P.L. 1836.

Take of Winter Green or Pyrola an ounce,
Distilled Water a pint and a half;
Boil down to a pint, and strain.

Remarks.—WINTER-GREEN is a small evergreen herb belonging to the natural family *Pyrolaceæ*, growing chiefly in North America; the stems and leaves are employed; the latter if fresh, but not when dried, exhale a peculiar odour if bruised, have an astringent bitter taste, and are so acrid as to inflame the skin when applied to it. No peculiar principle has been separated from Winter-green; it yields 18 per cent. of bitter extractive, in which its power probably resides.

Incompatibles.—Metallic salts in general, especially those of iron.

Pharmacopœia Preparation.—Decoctum Chimaphilæ.

Medicinal Use.—This decoction is tonic and promotes the action of the secreting organs, especially of the kidneys. Dose, f℥j. to f℥ij. three times a day.

DECOCTUM CINCHONÆ.

Decoction of Cinchona.

Decoctum Cinchonæ cordifoliæ, P.L. 1836.

Take of Yellow Cinchona, bruised, ten drachms,
Distilled Water a pint;

Boil for ten minutes in a lightly covered vessel, and strain the liquor while hot.

DECOCTUM CINCHONÆ PALLIDÆ.

Decoction of Pale Cinchona.

Decoctum Corticis Peruviani, P.L. 1788.
Decoctum Cinchonæ, P.L. 1809, P.L. 1824.
Decoctum Cinchonæ lancifoliæ, P.L. 1836.

DECOCTUM CINCHONÆ RUBRÆ.

Decoction of Red Cinchona.

Decoctum Cinchonæ oblongifoliæ, P.L. 1836.

Prepare these in the same manner in which the Decoction of Cinchona is directed to be made.

Incompatibles.—Ammonia, potash, soda and their carbonates. Lime-water, the salts of iron, lead, most soluble metallic salts, and solution of gelatin.

Medicinal Uses.—All these decoctions are useful as tonics in dyspepsia and general debility, and in intermittent and remittent diseases. These barks are now seldom employed in the state of powder. Of the decoctions, the dose is from f℥j. to f℥ij. twice or thrice a day.

Remarks.—Cinchona Barks are obtained from various species of trees belonging to the natural family *Cinchonaceæ,* which grow within a wide belt of the Andes, at a considerable elevation above the sea-level. The characteristics of the kinds employed by the College of Physicians are carefully described in the Materia Medica under their respective heads; but some other varieties (Weddell enumerates no less than thirty-nine varieties, under the heads of Grey, Lima, Red, Yellow, Rusty, and White Barks) are met with in commerce, which may also in some instances be advantageously employed in obtaining the alkaloids which all the Cinchonas contain; for further information respecting the characteristics, the sources, and varieties of Cinchona, I must refer to writers on Materia Medica and Botany, particularly to the Monograph of Weddell, "Histoire Naturelle des Quinquinas."

The different kinds of Cinchona bark differ widely in their composition; thus Yellow Cinchona bark contains much Quina, and but little Cinchonia; Pale Cinchona bark much Cinchonia, and but little Quina, whilst Red Cinchona bark yields both these alkaloids. Again, Aricina is found in Cusco bark, and some other alkaloids, the distinctive nature of which is as yet doubtful, as Paricinia, Pitoyina, Carthagenia, &c., have been described as existing in some particular varieties of Cinchona bark. These alkaloids are combined in the barks with Kinic acid, and with a modification of tannic acid, which has been termed kino-tannic acid, to the oxidation of which the formation of Cinchona-red is attributed. Besides these acids and alkaloids there are found in these barks kinate of lime, a yellow colouring matter, lignin, starch, a green fatty resin, gum, and a little volatile oil, and in addition to these, a base isomeric with Quina, termed Quinoidina, and another acid, the Kinovic, have been isolated by the researches of chemists.

Of these principles I shall now describe the most important, with the modes of obtaining them from the Cinchonas.

QUINA, which is chiefly obtained from Yellow Cinchona bark, contains it in the largest proportion, and many methods have been devised for its extraction. In this country, on account of the high price of alcohol, it is a desideratum to dispense with the use of so expensive a reagent, which was originally employed to procure this alkaloid by the discoverers Pelletier and Caventou. The following method was inserted in the last Pharmacopœia for preparing the most generally employed salt, the disulphate of quina; by this process I have obtained a very pure and beautiful salt, but it is one which, when the price of bark is high, is not to be recommended, as the whole of the quina the bark contains is certainly not ultimately obtained, although this possibly might be effected by concentrating the solution *in vacuo* after the addition of the oxide of lead, the use of soda to precipitate the crude quina, and then employing spirit according to the continental method.

QUINÆ DISULPHAS, P.L. 1836.

Disulphate of Quina.

Take of Heart-leaved Cinchona [Yellow Bark], *bruised, seven pounds,*
Sulphuric Acid nine ounces,
Purified Animal Charcoal two ounces,
Hydrated Oxide of Lead,
Solution of Ammonia,
Distilled Water, each as much as may be sufficient;

Mix four ounces and two drachms of the Sulphuric Acid with six gallons of distilled Water, and to these add the Cinchona; boil for an hour and strain. In like manner again boil what remains in Acid and Water, mixed in the same proportions, for an hour, and again strain. Lastly, boil the Cinchona in eight gallons of distilled water for three hours, and strain. Wash what remains frequently with boiling distilled water. To the mixed liquors add Oxide of Lead while moist, nearly to saturation. Pour off the supernatant liquor, and wash what is precipitated with distilled water. Boil the liquors for a quarter of an hour, and strain; then gradually add Solution of Ammonia to precipitate the Quina. Wash this until nothing alkaline is per-

ceptible. Let what remains be saturated with the rest of the Sulphuric Acid, diluted. Afterwards digest with two ounces of Animal Charcoal, and strain. Finally, the Charcoal being thoroughly washed, evaporate the liquor cautiously, that crystals may be produced.

Process.—The Quina existing in combination with kinic acid forms with it kinate of Quina, which is soluble to a certain extent in water, and is rendered more so by the sulphuric acid employed in the process, perhaps by decomposing it. Whatever may be the state of combination, the solution contains sulphuric acid, kinic acid, and quina, mixed with extractive, colouring, and various other matters. On adding oxide of lead the sulphuric acid combines with it, and the resulting insoluble sulphate is precipitated along with much colouring matter, extractive, &c., while the kinic acid and quina remain in solution; when ammonia is added after the separation of this precipitate, it unites with the kinic acid, and the kinate of ammonia formed remains in solution, while the quina is precipitated, and this when afterwards combined with sulphuric acid forms disulphate of quina, which crystallizes.

$$\overbrace{\underbrace{\begin{array}{c}\text{Sulphuric Acid}\\ \text{Oxide of Lead.}\end{array}}_{\textit{Sulphate of Lead.}}\quad\underbrace{\begin{array}{c}\text{Kinic Acid}\\ \text{Ammonia.}\end{array}}_{\textit{Kinate of Ammonia.}}\quad\underbrace{\begin{array}{c}\text{Quina}\\ \text{Sulphuric Acid.}\end{array}}_{\textit{Sulphate of Quina.}}}$$

Several other methods have been described to obtain this salt, but which it is unnecessary to detail in this work.

Properties.—When precipitated from the disulphate by an alkali, Quina is deposited in white flakes, which are not easily dried without their acquiring a brown tint. Quina is difficult to crystallize, but this may be effected by dissolving it in weak spirit, adding water until the solution becomes opalescent, when after some days a resinous kind of liquid is deposited, which is gradually converted into a mass of radiated acicular crystals; or when a saturated alcoholic solution is exposed to spontaneous evaporation in a dry and cold place, small crystals are deposited, which differ in form from those of Cinchonia. Both in the amorphous and crystallized state quina is a hydrate, but loses its water if carefully heated, and fuses into a resinous-like mass, which possesses the electrical characteristic of a resin. It is rendered phosphorescent by heat. The taste of quina is intensely bitter; it is slightly soluble in cold, and more so in hot water, dissolving in 200 times its weight of boiling water; it is very soluble in alcohol; it also dissolves in ether, and in the essential and fixed oils, with the assistance of heat. Lime-water dissolves as much quina as boiling water does, solution of chloride of calcium still more; ammonia and its carbonate also dissolve it slightly, but not so the solution of the fixed alkalis. Quina exists under two forms, which are isomeric; the first, quina, is crystallizable, and forms crystalline salts; the second, *quinoidina*, is both amorphous itself, and forms amorphous salts.

Composition.—Quina has been frequently and carefully analysed by several chemists; the analysis of Liebig has been confirmed by Regnault and Hlasiwetz. It consists of

Twenty equivalents of Carbon	$6 \times 20 =$	120	or	74·0
Twelve ,, of Hydrogen	$1 \times 12 =$	12	,,	7·4
One ,, of Nitrogen		14	,,	8·7
Two ,, of Oxygen	$8 \times 2 =$	16	,,	9·9
Equivalent		162.		100·

Formula...... $C^{20} H^{12} N O^{2}$.

Quina has a tendency to form subsalts with acids, consisting of two eqs. of base to one eq. of acid. Of these salts, the disulphate only is inserted in the Pharmacopœia.

Properties of Disulphate of Quina, P.L.—The crystals of this salt are colourless, acicular, and somewhat flexible, have a pearly lustre, a very bitter taste, and effloresce when exposed to the air; one part requires for solution about 740 parts of cold, 30 of boiling water, 80 of cold alcohol of specific gravity 0·850, and much less if boiling. When heated, disulphate of quina fuses and assumes the appearance of melted wax; it afterwards reddens, begins to decompose, and when the heat is raised to ignition is eventually dissipated.

Composition.—This salt consists of

Two equivalents of Quina	$162 \times 2 =$	324	or	74·31
One ,, of Sulphuric Acid		40	,,	9·17
Eight ,, of Water	$9 \times 8 =$	72	,,	16·52
Equivalent		436.		100·

Formula...... $2C^{20} H^{12} N O^{2}, SO^{3}, 8HO$.

By exposure to the air, or to a temperature of 212°, half the water is expelled, and when heated to 240° it loses half the remainder, retaining only two eqs.; it is questionable whether more can be expelled without at the same time decomposing the salt.

Impurities, Adulterations, and Tests.—The salts of Quina, especially the Disulphate, have been subjected to numerous sophistications; of these a common one is Sulphate of Cinchonia, which may be detected by treating a small portion of the suspected salt with abundance of lime-water; this dissolves the quina, but leaves the cinchonia insoluble. Stearic and margaric acids are detected by solution in boiling water; these float like drops of oil on the surface, which solidify on cooling. Sugar of milk, mannite, sugar, starch, gum, and the like, are immediately acted on when a few drops of sulphuric acid are added to the suspected salt, which colours and rapidly blackens if rendered impure by these substances; if not no change of colour ensues. To detect *Salicin*, which is the most frequent adulterant, dissolve half a drachm of the salt in three drachms of sulphuric acid; if it strikes a red or red-brown colour, salicin may be suspected; dilute this solution with six fluidrachms of water, which will precipitate the salicin, and this, slightly washed with water, may be recognised by the bright red colour it yields with concentrated sulphuric acid. The addition of lime, or a caustic alkali, will detect any salt of ammonia by liberating ammoniacal fumes; and inorganic bodies, as gypsum, leave a residue after the salt has been ignited to redness. See also MATERIA MEDICA: *Quinæ Disulphas.*

Incompatibles.—Alkalis and their carbonates, lime-water, oxalic, tartaric, and gallic acids and their salts, tincture of galls, and many astringent vegetable infusions, decoctions, and tinctures.

Medicinal Uses and Dose.—Quinæ Disulphas is a prominent example of the advantages which Medicine has derived from Chemistry. It possesses all the virtues of the yellow cinchona bark, unmixed with inert or superfluous substances, such as the woody fibre or resin. Dose, from gr. iij. to gr. x.

CINCHONIA may be procured from pale cinchona bark which contains it, by the same plan as quina is from yellow cinchona bark. Its properties are as follows: When the alcoholic solution is suffered to evaporate slowly the cinchonia separates in slender quadrilateral prismatic crystals; but when the evaporation is rapid it is deposited in colourless, translucent, crystalline plates. It requires 2500 times its weight of boiling water for solution, and in cold water it is nearly insoluble; it has a bitter taste, which is slowly developed on account of its slight solubility; when dissolved in an acid its taste is intensely bitter. It suffers no change by exposure to the air. It is very soluble in alcohol, especially when hot, and on cooling, crystals are deposited. It is almost insoluble in ether, and quite so in lime-water, in solutions of hypochlorite of lime, and chloride of calcium. It restores the colour of litmus which has been reddened, and combines with acids to form neutral and crystallizable salts. When strongly heated it is totally decomposed, yielding carbonate of ammonia among other products.

Cinchonia is composed of

Twenty equivalents	of Carbon	6×20=120	or 78·0
Twelve ,,	of Hydrogen	1×12= 12	,, 7·8
One ,,	of Nitrogen	14	,, 9·0
One ,,	of Oxygen	8	,, 5·2
	Equivalent	154·	100·

Formula..... $C^{20} H^{12} N O$.

The Cinchonia of commerce is a very variable preparation, often containing a basic resin and Cinchotina, which crystallizes in large hard rhombs, and is very soluble in ether. Cinchonia contains one eq. less oxygen than exists in Quina.

Aricina is procured from Cuzco or Arica bark, by the same methods employed for obtaining quina and cinchonia. It crystallizes in brilliant acicular crystals; at first it is tasteless, then warm and harsh; it is insoluble in water, soluble in alcohol, in ether, and in ammonia. Nitric acid turns it of a deep green colour. It consists of

Twenty equivalents	of Carbon	6×20=120	or 70·6
Twelve ,,	of Hydrogen	1×12= 12	,, 7·1
One ,,	of Nitrogen	14	,, 8·2
Three ,,	of Oxygen	8× 3= 24	,, 14·1
		170.	100·

Formula..... $C^{20} H^{12} N O^{3}$.

Pelletier has pointed out that these alkaloids may be regarded as oxides of a common base $C^{20} H^{12} N$.

Kinic Acid, with which these alkaloids are combined in the Cinchona-barks, is obtained by adding lime to an infusion or decoction of bark, evaporating the clear solution to syrup, which on standing deposits crystals of kinate of lime; these, decomposed by sulphuric or oxalic acid, yield kinic acid, which crystallizes in rhombic prisms, very soluble in water, and of a powerful acid taste, having no action upon gelatin nor the persalts of iron. The crystallized acid contains one eq. of water, and consists of

Seven equivalents	of Carbon	6×7=42	or 43·74
Six ,,	of Hydrogen	1×6= 6	,, 6·26
Six ,,	of Oxygen	8×6=48	,, 50·00
		96.	100·

Formula..... $C^{7} H^{5} O^{5}, HO$.

The remaining constituents of Cinchona-barks are not sufficiently important to demand any detailed notice of them.

DECOCTUM CYDONII.

Decoction of Quince [Seeds].

Mucilago Seminum Cydoniorum, P.L. 1746.
Mucilago Seminis Cydonii Mali, P.L. 1788.
Decoctum Cydoniæ, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Quince [Seeds] two drachms,
Distilled Water a pint;
Boil with a slow fire for ten minutes; afterwards strain.

Remarks.—The Quince belongs to the natural order *Rosaceæ.* The rind of the fruit yields a little œnanthic ether, to which its peculiar fragrant scent is owing, and the seeds contain a large quantity of inodorous and insipid mucilaginous matter, which is readily dissolved by water. The decoction is viscid and nearly colourless.

Incompatibles.—Alcohol, acids, and most metallic solutions.

Medicinal Uses.—This decoction has been recommended as an application to erysipelatous surfaces: it is also employed in aphthous affections and excoriations of the mouth, &c. It very speedily suffers decomposition, and on this account should never be kept ready prepared.

DECOCTUM DULCAMARÆ.

Decoction of Woody Nightshade.

Decoctum Dulcamaræ, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Woody Nightshade, ten drachms,
Distilled Water a pint and a half;
Boil down to a pint, and strain.

Remarks.—WOODY NIGHTSHADE is an indigenous plant belonging to the natural family *Solanaceæ,* its active principle being an alkaloid called *Solania,* which is combined in the plant with malic acid. Solania is colourless, pulverulent and pearly; it is insoluble in cold water, and requires 8000 times its weight when boiling to dissolve it. In oil it is insoluble, sparingly soluble in ether, but readily so in alcohol. It has the alkaline properties of restoring the blue colour of reddened litmus paper, and of saturating acids to form salts. Solania also occurs in the sprouted germs of potatoes; it is extremely poisonous.

Incompatibles.—The alkalies and their carbonates.

Medicinal Uses.—Diuretic and narcotic. Dose, from fʒiv. to f℥j. three times a day, combined with an aromatic.

DECOCTUM GALLÆ.

Decoction of Galls.

Take of Bruised Galls two and a half ounces,
Distilled Water two pints;
Boil down to a pint, and strain.

Incompatibles.—Alkalis and their carbonates, lime-water, the salts of iron, and of most metals. The decoctions of Cinchona-barks.

Medicinal Uses.—This decoction has now been introduced into the Pharmacopœia, and is useful as a powerful astringent in chronic diarrhœa, &c. Dose, ℥j. to ℥ij. several times a day. It is also used as an external astringent lotion.

DECOCTUM GRANATI.

Decoction of Pomegranate.

Decoctum Granati, P.L. 1836.

Take of Pomegranate [rind] two ounces,
Distilled Water a pint and a half;
Boil down to a pint, and strain.

Remarks.—The Pomegranate belongs to the natural family *Myrtaceæ.* The rind of the fruit is astringent, and contains gum, extractive, and tannic acid. The decoction is given in doses of f℥ss. to f℥j. It has been found useful in dysentery.

DECOCTUM GRANATI RADIX.

Decoction of Pomegranate Root.

Take of Sliced Pomegranate Root [the bark of the Root] two ounces,
Distilled Water two pints ;
Boil down to a pint, and strain.

Remarks.—Pomegranate bark contains upwards of twenty per cent. of tannic acid, and probably gallic acid as well, gum, starch’ and an acrid substance which appears to possess basic properties, which has been called *Punicina.*

Incompatibles.—As *Decoctum Gallæ.*

Medicinal Uses.—Exclusively as an anthelmintic. It is more efficient than the Decoctum Granati.

DECOCTUM HÆMATOXYLI.

Decoction of Logwood.

Take of Sliced Logwood two drachms,
Distilled Water a pint and a half;
Boil down to a pint, and strain.

Incompatibles.—Acids, lime-water, and most metallic salts.

Medicinal Uses.—As an astringent in protracted diarrhœa and dysentery. Dose, f℥j. to f℥iij.

DECOCTUM HORDEI.

Decoction of Barley.

Aqua Hordeata, P.L. 1746.
Decoctum Hordei, P.L. 1788, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Barley [Pearl Barley] two ounces and a half,
Water four pints and a half;

First wash the Barley with water lest anything should adhere to it; then half a pint of the Water being poured upon it, boil for a short time. This Water being thrown away, pour on [the barley] that which is left, first made hot; then boil down to two pints, and strain.

Pharmacopœia Preparations.—Decoctum Hordei Compositum, Enema Aloes, Enema Assafœtidæ, Enema Terebinthinæ.

DECOCTUM HORDEI COMPOSITUM.

Compound Decoction of Barley.

Decoctum Pectorale, P.L. 1721, P.L. 1746.
Decoctum Hordei Compositum, P.L. 1788, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Decoction of Barley two pints,
Figs, sliced, two ounces and a half,
Fresh Liquorice [Root], bruised, five drachms,
Stoned Raisins two ounces and a half,
Distilled Water a pint;
Boil down to two pints, and strain.

Remarks.—PEARL-BARLEY is the seed, stripped of husk, of the *Hordeum Distichon*, belonging to the natural family *Gramineæ*. It chiefly consists of starch, gluten, albumen, and water. A portion of this starch has been regarded as a distinct modification of this vegetable principle and termed *hordein*, insolubility after prolonged boiling being its distinctive characteristic.

The RAISINS are used to sweeten and flavour the decoction; they are the dried fruit of the *Vitis vinifera*. For remarks on Grape-sugar, the modification of sugar contained in Raisins, see SYRUPUS.

Medicinal Uses.—This and the simple decoction are useful demulcents in fever, phthisis, gonorrhœa and strangury, given *ad libitum*.

DECOCTUM PAPAVERIS.

Decoction of Poppy.

Decoctum Papaveris, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Poppy [Capsules], bruised, four ounces,
Water four pints;
Boil for a quarter of an hour, and strain.

Medicinal Uses.—Externally as an anodyne fomentation in painful swellings, and in the excoriations produced by the acrid discharge of ulcers.

DECOCTUM PAREIRÆ.

Decoction of Pareira.

Take of Pareira, sliced, ten drachms,
Distilled Water a pint and a half;
Boil down to a pint, and strain.

Remarks.—PAREIRA-ROOT (*Pareira brava*) is imported from the West Indies. The plant producing it belongs to the natural family *Menispermaceæ*, and contains besides some resinous matter and common vegetable products, a bitter principle termed by Wiggers *Cissampelina* or *Pelosina*, possessing basic properties; its salts appear to be uncrystallizable. Both this base and its salts decompose by exposure to air. It does not appear to have been analysed.

Incompatibles.—The salts of lead, the persalts of iron and most metallic preparations.

Pharmacopœia Preparations.—Decoctum Pareiræ, Extractum Pareiræ.

Medicinal Uses.—As a tonic diuretic in chronic inflammation of the bladder. *Dose of the decoction,* f℥j. to f℥ij.

DECOCTUM QUERCUS.

Decoction of Oak [Bark].

Decoctum Quercûs, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Oak [Bark], bruised, ten drachms,
Distilled Water two pints;
Boil down to a pint, and strain.

Remarks.—The Oak is an indigenous tree belonging to the natural family *Cupuliferæ*; the well-known astringent property of its bark is due to a proximate principle called *tannic acid* or *tannin*, on account of its power of converting skin into leather. Infusions or decoctions of all vegetable matters which are employed in tanning give an insoluble precipitate with albumen and gelatin, and a dark-coloured one with the salts of iron.

Incompatibles.—Decoctions of cinchona, metallic salts, solution of isinglass, and alkaline solutions destroy its astringency.

Medicinal Uses.—This decoction is principally employed in the form of gargle, injection, or lotion, as a local astringent. It is nearly inodorous and has a very astringent taste.

DECOCTUM SARSÆ.

Decoction of Sarsaparilla.

Decoctum Sarsaparillæ, P.L. 1788, P.L. 1809, P.L. 1824.
Decoctum Sarzæ, P.L. 1836.

Take of Sarsaparilla, sliced, five ounces,
Distilled Water, boiling, four pints;
Boil down to two pints, and strain.

Remarks.—Sarsaparilla is the root of a creeper belonging to the natural family *Smilaceæ*. There are several varieties imported, of which the most important are the Brazilian, Lima, Honduras, and Jamaica; the last of these being the description selected by the College.

Properties.—It has a somewhat nauseous and slightly acrid taste, and contains a crystalline principle, *smilacin*, traces of an essential oil, starch, mucilage, and ligneous matter. *Smilacin* occurs in acicular crystals, slightly soluble in water, exerting no action on litmus paper; it has a disagreeable bitter taste, and consists of

Six equivalents	of Carbon....	6×6=36	or 63·16
Five „	of Hydrogen..	1×5= 5	„ 8·77
Two „	of Oxygen....	8×2=16	„ 28·07
	Equivalent......	57	100·

Formula...... $C^6 H^5 O^2$.

Adulterations and Tests.—Several roots resembling Sarsaparilla are sometimes mixed with the genuine root, for the characteristics of which see MATERIA MEDICA: *Sarsa* (*Jamaicensis*).

Incompatibles.—Lime-water, the acetates of lead, some salts of mercury and other metals.

Pharmacopœia Preparations.—Decoctum Sarsæ, Decoctum Sarsæ Compositum, Extractum Sarsæ Liquidum, Syrupus Sarsæ.

Medicinal Uses.—Alterative, Demulcent. Dose, f℥iv. to f℥viij.

DECOCTUM SARSÆ COMPOSITUM.

Compound Decoction of Sarsaparilla.

Decoctum Sarsaparillæ Compositum, P.L. 1788, P.L. 1809, P.L. 1824.

Decoctum Sarzæ Compositum, P.L. 1836.

Take of Decoction of Sarsaparilla, boiling, four pints,
Sassafras, sliced,
Guaiacum Wood, rasped,
Fresh Liquorice [Root], bruised, each ten drachms,
Mezereon [Bark of the Root], three drachms;
Boil for a quarter of an hour, and strain.

Remarks.—SASSAFRAS is the root of a tree belonging to the natural family *Lauraceæ*; it has a pleasant fragrant smell, owing to the *Essential Oil of Sassafras*, which is heavier than water, and like the other essential oils consists of a liquid, and a concrete or camphor-oil, which are probably isomeric. The camphor which separates when the oil is cooled much below 32°, is composed of

Ten equivalents	of Carbon	$6\times10=60$	or 74·07
Five „	of Hydrogen . .	$1\times 5=5$	„ 6·18
Two „	of Oxygen	$8\times 2=16$	„ 19·75
	Equivalent.	81.	100·

Formula. . . . . . $C^{10} H^5 O^2$.

Mezereon is the most active substance here added to the sarsaparilla; it contains a neutral vegetable substance called *Daphnin*, from the name of the indigenous shrub, *Daphne Mezereon*, of the natural family *Thymelaceæ*. *Daphnin* is very soluble in boiling water, has a bitter and somewhat astringent taste, and turns yellow when treated with solution of potash.

Medicinal Uses.—Of the Decoction, diaphoretic and alterative. It is esteemed useful in secondary syphilis and in rheumatism. Dose, f℥iv. to f℥vi. three or four times a day.

DECOCTUM SCOPARII COMPOSITUM.

Compound Decoction of Broom.

Decoctum Scoparii Compositum, P.L. 1836.

Take of Broom [fresh tops],
Juniper, bruised,
Dandelion [Root], bruised, each half an ounce,
Distilled Water a pint and a half;
Boil down to a pint, and strain.

Remarks.—The Broom is an indigenous shrub belonging to the natural family *Leguminosæ*. The fresh tops have a peculiar smell, and bitter disagreeable taste, which latter is owing to a neutral crystalline substance which they contain, together with an essential and concrete oil. The ash of Broom tops yields a strong alkaline ley.

Juniper is the fruit of an indigenous tree belonging to the natural family *Coniferæ*. The fruit (berry) is about the size of a hog-pea, and has a peculiar aromatic turpentine-like smell and taste. The berries contain resin, gum, sugar, wax, and *Essential*

Oil of Juniper, which is colourless, and differs considerably in its boiling-point and specific gravity, according to the proportions of camphor and oil it contains. It is one of the most difficult oils to preserve, being very rapidly oxidized and converted into resin. The camphor and oil are isomeric, and are identical in composition with oil of turpentine.

Pharmacopœia Preparation.—Spiritûs Juniperi Compositum.

For *Adulterations and Tests* of Oil of Juniper, see Note at the end of Section, AQUÆ. If pure, a drop of this oil on paper rapidly thickens and is soon converted into resin.

Medicinal Use.—This decoction is possessed of considerable diuretic properties, which may be still further increased by the addition of small doses of tartrate or acetate of potash. It has been found efficient in dropsy. Dose, f℥j. to f℥iv. three times a day.

DECOCTUM SENEGÆ.

Decoction of Senega.

Decoctum Senegæ, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Senega ten drachms,
Distilled Water two pints;
Boil down to a pint, and strain.

Remarks.—SENEGA or Snake-root, belonging to the natural family *Polygalaceæ*, is supposed to contain two volatile acids, the *Polygalic* and *Virgineic*, respecting which very little is known.

Medicinal Uses.—Expectorant, diuretic, and diaphoretic. It has been recommended in pneumonic affections attended with accumulation of mucus in the bronchia, and as a diaphoretic in chronic rheumatism. Dose, f℥iss. to f℥iij. two or three times a day.

DECOCTUM TARAXACI.

Decoction of Dandelion.

Take of Dandelion, bruised, four ounces,
Distilled Water a pint and a half;
Boil down to a pint, and strain.

Remarks.—This decoction has been inserted in the present Pharmacopœia. Dandelion belongs to the natural family *Compositæ*; it is indigenous and abounds in a milky juice containing a crystalline neutral substance *Taraxcin*, resin, fatty matter, mannite, and caoutchouc. Taraxcin is procured by boiling this milky juice in distilled water, concentrating the clear solution and abandoning it to spontaneous evaporation, when crystals of taraxcin are deposited. It is readily fusible but is not volatile, and has a bitter and slightly acrid taste. It contains no nitrogen, but does not appear to have been quantitatively analysed.

Pharmacopœia Preparations.—Decoctum Scoparii Compositum, Decoctum Taraxaci, Extractum Taraxaci.

Medicinal Uses.—Tonic in dyspepsia and affections of the biliary organs. Dose, f℥j. to f℥ij.

DECOCTUM TORMENTILLÆ.

Decoction of Tormentil.

Decoctum Tormentillæ, P.L. 1836.

Take of Tormentil, bruised, two ounces,
Distilled Water a pint and a half;
Boil down to a pint, and strain.

Remarks.—Tormentil belongs to the natural family *Rosaceæ*; its active principle is tannic acid.

Incompatibles.—As Decoctum Gallæ.

Pharmacopœia Preparations.—Decoctum Tormentillæ, Pulvis Cretæ Compositus.

Medicinal Uses.—It has been found useful as an astringent and tonic in diarrhœa and alvine fluxes. Dose, f℥j. to f℥iss. three or four times a day.

DECOCTUM ULMI.

Decoction of Elm [Bark].

Decoctum Ulmi, P.L. 1788, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Elm [Bark], bruised, two ounces and a half,
Distilled Water two pints;
Boil down to a pint, and strain.

Remarks.—The Elm belongs to the natural family *Cupuliferæ*, (*Ulmaceæ*, Lind.), and its bark contains several proximate principles, among the rest tannic acid, but not in so great quantity as oak bark.

Incompatibles.—As Decoctum Gallæ.

Medicinal Uses.—Diuretic, and in herpetic eruptions. Its powers are questionable. Dose, f℥iv. to f℥vj. three or four times a day.

DECOCTUM UVÆ URSI.

Decoction of Whortleberry.

Decoctum Uvæ Ursi, P.L. 1836.

Take of Whortleberry [Leaves] an ounce,
Distilled Water a pint and a half;
Boil down to a pint, and strain.

Remarks.—The Whortleberry is a low shrub belonging to the natural family *Ericaceæ*, the leaves of which contain considerable quantities of both tannic and gallic acids.

Incompatibles.—As Decoctum Gallæ.

Pharmacopœia Preparations.—Decoctum Uvæ Ursi, Extractum Uvæ Ursi.

Medicinal Uses.—Very much employed in purulent and other affections of the urinary organs. Dose, f℥j. to f℥ij.

EMPLASTRA.

PLASTERS.

EMPLASTRUM AMMONIACI.

Plaster of Ammoniacum.

Emplastrum Ammoniaci, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Prepared Ammoniacum five ounces,
Diluted Acetic Acid eight fluidounces;

Dissolve the Ammoniacum in the Acid; then evaporate the liquor over a slow fire, constantly stirring to a proper consistence.

Medicinal Uses.—Stimulant and discutient, applied to white swellings, scrofulous tumours, &c.

EMPLASTRUM AMMONIACI CUM HYDRARGYRO.

Plaster of Ammoniacum with Mercury.

Emplastrum ex Ammoniaco cum Mercurio, P.L. 1746.
Emplastrum Ammoniaci cum Hydrargyro, P.L. 1788, P.L. 1809, P.L. 1824, P.L. 1836.

Take of prepared Ammoniacum a pound,
Mercury three ounces,
Olive Oil a fluidrachm,
Sulphur eight grains;

To the heated Oil gradually add the Sulphur, stirring constantly with a spatula, until they incorporate; then rub the Mercury with them, until globules are no longer visible; lastly, gradually add the Ammoniacum, melted, and mix them all.

Medicinal Uses.—Similar to the former, but more powerful, especially in venereal nodes.

EMPLASTRUM BELLADONNÆ.

Plaster of Belladonna.

Emplastrum Belladonnæ, P.L. 1836.

Take of Extract of Belladonna,
Plaster of Soap, of each three ounces;

To the Plaster, melted with the heat of a water-bath, add the Extract, and mix, constantly stirring to obtain a proper consistence.

Medicinal Uses.—Anodyne and antispasmodic. Applied to the sacrum it relieves pain in dysmenorrhœa.

EMPLASTRUM CANTHARIDIS.

Plaster of Cantharides.

Emplastrum Epispasticum, P.L. 1721.
Emplastrum Vesicatorium, P.L. 1746.
Emplastrum Cantharidis, P.L. 1788.
Emplastrum Lyttæ, P.L. 1809.
Emplastrum Cantharidis, P.L. 1824, P.L. 1836.

Take of Cantharides, rubbed to very fine powder, a pound,
Wax,
Suet, each seven and a half ounces,
Resin three ounces,
Lard six ounces;

To the Wax, Suet, and Lard melted together, add the Resin previously melted. Then take them from the fire, and a short time before they solidify, sprinkle in the Cantharides, and mix.

Remarks.—The CANTHARIS *vesicatoria*, or Spanish fly, is an insect of the order *Coleoptera*, and is now chiefly imported from Russia and Sicily, but formerly, as indicated by the name, from Spain.

Properties.—They are shining, green, winged beetles, from six to ten lines in length, and weigh about one grain and a half; they have a penetrating fœtid smell, with a faint taste, followed by acridity. Cantharides yield their active principle, *Cantharidin*, to boiling water, to spirit, especially when heated, to ether, &c.; it appears to exist chiefly in the softer parts of the insect. When procured from the alcoholic solution, after being decolorized by animal charcoal, it occurs as small, colourless, pearly prisms; it is neutral to test-papers, insoluble in water, but rendered soluble by some principle which the insect contains; it is sparingly soluble in cold alcohol, but readily so in hot, and again separates from it on cooling; cold ether takes it up easily, and it dissolves in the fixed and volatile oils, in solution of potash or soda, and is again precipitable from the two last by strong acetic acid, which reaction renders the use of Cantharides in Acetum Cantharidis somewhat problematical; ammonia does not act upon it.

Strong boiling sulphuric acid dissolves cantharidin, the solution is slightly brown, and when diluted with water, it yields small acicular crystals of cantharidin: boiling nitric acid dissolves it without alteration of colour, and on cooling, it is again deposited from it.

Cantharidin evaporates slowly at common temperatures, at 210° it fuses, and volatilizes at a somewhat higher temperature in acrid crystallizable vapours.

Composition.—According to the accurate analyses of Regnault, Cantharidin consists of

Ten equivalents of Carbon....	6×10=	60	or 61·22
Six ,, of Hydrogen	1× 6=	6	,, 6·12
Four ,, of Oxygen ..	8× 4=	32	,, 32·66
		—	——
Equivalent......		98.	100·

Formula...... $C^{10}H^{6}O^{4}$.

Impurities and Adulterations.—Cantharides are sometimes mixed with other insects resembling them, as the *Lytta Syriaca*; and when in powder with inert substances, and with euphorbium, black pepper, &c. They should always be purchased whole, free from dust and mites.

Pharmacopœia Preparations.—Acetum Cantharidis, Ceratum Cantharidis, Emplastrum Cantharidis, Tinctura Cantharidis, Unguentum Cantharidis.

Medicinal Uses.—Externally as an irritant and rubefacient, and for raising blisters when applied to the skin. Internally as a diuretic, and in paralysis of the neck of the bladder.

Note.—In spreading this plaster, great care should be taken that heat be not employed, or that it be merely sufficient to soften it; a high temperature decomposes the animal matter, and totally destroys the efficacy of the plaster.

EMPLASTRUM CUMINI.

Plaster of Cummin.

Take of Cummin,
Caraway,
Bay, each three ounces,
Prepared Burgundy Pitch three pounds,
Wax three ounces,
Olive Oil,
Water, each a fluidounce and a half;

The Pitch and Wax being melted together, add the dry materials rubbed to powder, the Oil and the Water, then evaporate to a proper consistence.

Remarks.—CUMMIN belongs to the natural family *Umbelliferæ*: it possesses a powerful and nauseous smell and taste; its virtues principally depend on the

Essential Oil of Cummin, which is of a yellowish colour, and taste and odour resembling the fruit; it contains oils differing in their volatility, boiling at the commencement at 338°, and rising to 446° and upwards; it consists of an oxygenated oil *Cuminol*, and an hydro-carbon *Cymin*, of which the latter is the more volatile. Oil of Cummin has been made the subject of numerous investigations, respecting which I must refer to chemical authorities for further information, as they are interesting solely on scientific grounds.

For *Adulterations and Tests*, see Note at foot of Section AQUÆ.

Medicinal Uses.—Stimulant and detergent, applied to indolent ulcers.

EMPLASTRUM FERRI.

Plaster of Iron.

Take of Sesquioxide of iron an ounce,
Plaster of Lead eight ounces,
Prepared Frankincense two ounces;

The Plaster and Frankincense being melted together over a slow fire, sprinkle in the Sesquioxide, and mix.

Medicinal Uses.—This plaster, which has been newly inserted in the Pharmacopœia, is employed spread on cloth or leather for weakness of the joints. It seems probable that the imagination must greatly assist the plaster where any good results from its application.

EMPLASTRUM GALBANI.

Plaster of Galbanum.

Diachylon Magnum cum Gummi, P.L. 1721.
Emplastrum Commune cum Gummi, P.L. 1746.
Emplastrum Lithargyri cum Gummi, P.L. 1788.
Emplastrum Lithargyri Compositum, P.L. 1788, edit. alt.
Emplastrum Galbani Compositum, P.L. 1809, P.L. 1824.
Emplastrum Galbani, P.L. 1836.

Take of Prepared Galbanum eight ounces,
Plaster of Lead three pounds,
Turpentine [*American*] an ounce,
Prepared Frankincense three ounces;

To the Galbanum and Turpentine melted together, first add the Frankincense, then the Plaster of Lead, melted with a slow fire, and mix them all together.

Remarks.—TURPENTINE is obtained from trees belonging to the natural family *Pinaceæ*, and is imported from North America; it is more or less translucent, of a whitish-brown or whitish-yellow colour, of a thick almost solid consistence, becoming more solid by keeping, has a pleasant aromatic smell and a warm and bitter taste. According to Barras, it consists of four distinct resins, succinic acid, extractive matter, and

Essential Oil of Turpentine, which is a colourless and very mobile liquid, and is now met with in commerce in a state of great purity under the name of *Camphine*. Oil of Turpentine is obtained by distillation from American and other descriptions of turpentine, and subsequent rectification; it has a peculiar smell and taste, it is neutral to test-paper, and is very slightly soluble in water, rectified spirit dissolves but comparatively little of it; it is an excellent solvent for resinous and oily substances, softens in some measure caoutchouc, and is largely employed for industrial purposes and as a means of producing artificial light. Its specific gravity is about 0·86, and its boiling-point 315°. Oil of Turpentine is a hydro-carbon, consisting of

Twenty equivalents of Carbon	$6 \times 20 =$	120	or 88·23
Sixteen „ of Hydrogen ..	$1 \times 16 =$	16	„ 11·77
Equivalent........		136.	100·

Formula...... $C^{20} H^{16}$.

Oil of Turpentine is isomeric with many other essential oils, and its formula $C^{20} H^{16} \div 4 = C^{5} H^{4}$ is regarded as the common type of this numerous class of bodies. By the action of different reagents on oil of turpentine several interesting compounds result, but which it is beyond the scope of this work to notice.

COLOPHONY.—Common Rosin is left in the retort when turpentine is distilled. Its specific gravity is 1·080, it fuses at 274°, and is a mixture of three or four distinct resins, of which *Pinic* and *Sylvic acids* are the most important. Pinic acid combines and forms salts with the various earthy and metallic bases; it is soluble in oil of turpentine, alcohol, and ether, but does not crystallize. Sylvic acid, on the contrary, readily crystallizes from its alcoholic solution in triangular tables; it is isomeric with Pinic acid, both these acids being derived from Pimaric acid, which is the state in which they exist in the fir. Crystallized Sylvic acid consists of

Forty equivalents of Carbon	$6 \times 40 =$	240	or 79·46
Thirty „ of Hydrogen	$1 \times 30 =$	30	„ 9·94
Four „ of Oxygen	$8 \times 4 =$	32	„ 10·60
Equivalent........		302.	100·

Formula...... $C^{40} H^{30} O^{4}$.

Rose has remarked that when sylvic acid is kept in solution it absorbs oxygen, and will then no longer crystallize. The same composition and formula represent Colophony, and Pinic and Pimaric acids.

Adulterations, Impurities and Tests.—Adulteration is not probable either in turpentine, its essential oil, nor its resin; the two latter substances being themselves but too frequently employed as adulterants. The odour of the oil, and the very sooty flame with which it burns, are its best characteristics. The same qualities and its brittleness, shining fracture, and compactness are the distinctive characters of *rosin.*

Pharmacopœia Preparations.—Of Turpentine, Emplastrum Galbani, Unguentum Elemi. Of Oil of Turpentine, Enema Terebinthinæ, Linimentum Terebinthinæ. Of Resin of Turpentine, Ceratum Resinæ, Emplastrum Cantharidis, Emplastrum Picis, Emplastrum Resinæ, Emplastrum Saponis, Unguentum Picis.

Medicinal Uses.—Oil of Turpentine taken internally acts as a diuretic and sudorific, and as an anthelminthic, &c., applied externally, it is rubefacient and stimulating. Resin is externally used as a stimulant and detergent application to foul ulcers. Emplastrum Galbani is stimulant and discutient, and is said to be particularly serviceable in cases of indolent glandular enlargements of a strumous character.

EMPLASTRUM HYDRARGYRI.

Plaster of Mercury.

Emplastrum Mercuriale, P.L. 1721.
Emplastrum Commune cum Mercurio, P.L. 1746.
Emplastrum Lithargyri cum Hydrargyro, P.L. 1788.
Emplastrum Hydrargyri, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Mercury three ounces,
Plaster of Lead a pound,
Olive Oil a fluidrachm,
Sulphur eight grains;

To the heated Oil add the Sulphur gradually, stirring constantly with a spatula until they incorporate; afterwards rub the Mercury with them, until globules are no longer visible; then gradually add the Plaster melted with a slow fire, and mix them all together.

Medicinal Uses.—Alterative. Discutient. It is less powerful than the Emplastrum Ammoniaci cum Hydrargyro.

EMPLASTRUM OPII.

Plaster of Opium.

Emplastrum Opii, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Extract of Opium an ounce,
Plaster of Lead eight ounces,
Prepared Frankincense two ounces,
Boiling Water a fluidounce;

To the melted Frankincense add the Plaster melted over a slow fire, and the Extract previously mixed with the Water; and evaporate over a slow fire, constantly stirring, until a proper consistence is obtained.

Medicinal Use.—Anodyne.

EMPLASTRUM PICIS.

Plaster of Pitch.

Emplastrum Cephalicum, P.L. 1746.
Emplastrum Picis Burgundicæ, P.L. 1788.
Emplastrum Picis Burgundicæ Compositum, P.L. 1788, edit. alt.
Emplastrum Picis Compositum, P.L. 1809, P.L. 1824.
Emplastrum Picis, P.L. 1836.

Take of Prepared Burgundy Pitch two pounds,
Prepared Frankincense a pound,
Resin,
Wax, each four ounces,
Expressed Oil of Nutmegs an ounce,
Olive Oil,
Water, each two fluidounces;

To the Frankincense, Pitch, Resin, and Wax melted together, add the Oils and the Water. Then, stirring constantly, boil down to a proper consistence.

Medicinal Uses.—Stimulant. Rubefacient in pulmonary complaints; but it frequently produces too great a degree of irritation.

EMPLASTRUM PLUMBI.

Plaster of Lead.

Diachylon Simplex, P.L. 1721.
Emplastrum Commune, P.L. 1746.
Emplastrum Lithargyri, P.L. 1788.
Emplastrum Plumbi, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Oxide of Lead, rubbed to very fine powder, six pounds,
Olive Oil a gallon,
Water two pints;

Boil them together with a slow fire, constantly stirring, until the Oil and Oxide of Lead unite into the consistence of a melted plaster; but it will be proper to add a little boiling Water, if nearly the whole of that which was used in the beginning should be evaporated before the end of the boiling.

Medicinal Uses.—It is largely employed in the bases of many other plasters, and is a common application to excoriations, and for retaining the edges of fresh cut wounds in a state of apposition, and defending them from the air.

Pharmacopœia Preparations.—Emplastrum Ferri, Emplastrum Galbani, Emplastrum Hydrargyri, Emplastrum Opii, Emplastrum Resinæ, Emplastrum Saponis, Unguentum Plumbi Compositum.

EMPLASTRUM POTASSII IODIDI.

Plaster of Iodide of Potassium.

Take of Iodide of Potassium an ounce,
Prepared Frankincense six ounces,
Wax six drachms,
Olive Oil two fluidrachms;

To the Frankincense and Wax melted together add the Iodide, previously rubbed with the Oil, and stir constantly till they have cooled. This plaster is to be spread on linen, rather than on tawed leather.

Medicinal Uses.—Applied to chronic or glandular swellings, and scrofulous tumours.

EMPLASTRUM RESINÆ.

Plaster of Resin.

Emplastrum Adhæsivum, P.L. 1721.
Emplastrum Commune Adhæsivum, P.L. 1746.
Emplastrum Lithargyri cum Resina, P.L. 1788.
Emplastrum Resinæ, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Resin half a pound,
Plaster of Lead three pounds;

To the Plaster, melted with a slow fire, add the Resin, previously liquified, and mix.

Medicinal Uses.—Stimulant. Defensive.

EMPLASTRUM SAPONIS.

Plaster of Soap.

Emplastrum e Sapone, P.L. 1721, P.L. 1746.
Emplastrum Saponis, P.L. 1788, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Soap, sliced, half a pound,
Plaster of Lead three pounds,
Resin an ounce;

Add the Soap and Resin, previously liquified, to the Plaster melted over a slow fire; then evaporate the whole, stirring constantly, to a proper consistence.

Pharmacopœia Preparation.—Emplastrum Belladonnæ.
Medicinal Use.—Discutient.

ENEMATA.

ENEMAS.

ENEMA ALOES.

Enema of Aloes.

Enema Aloës, P.L. 1836.

Take of Aloes two scruples,
Carbonate of Potash fifteen grains,
Decoction of Barley half a pint;
Mix, and rub them together.

Medicinal Use.—It is employed for dislodging ascarides from the rectum, and likewise as a stimulant in constipation attendant upon amenorrhœa.

ENEMA ASSAFŒTIDÆ.

Enema of Assafœtida.

Take of Prepared Assafœtida a drachm,
Decoction of Barley half a pint;
Rub the Assafœtida with the Decoction gradually added, until they are thoroughly mixed.

Medicinal Use.—In flatulent constipation it is very effectual.

ENEMA COLOCYNTHIDIS.

Enema of Colocynth.

Enema Colocynthidis, P.L. 1836.

Take of Extract of Colocynth half a drachm,
Soft Soap an ounce,
Water a pint;
Mix, and rub them together.

Medicinal Use.—A very efficient enema in cases of obstinate constipation and colic.

ENEMA OPII.

Enema of Opium.

Enema Opii, P.L. 1836.

Take of Decoction of Starch four fluidounces,
Tincture of Opium thirty minims;
Mix.

Medicinal Use.—The bulk of the fluid is small for the obvious purpose of causing it to be retained for some time, so that it may act as an anodyne to irritable bowels.

ENEMA TABACI.

Enema of Tobacco.

Infusum Tabaci, P.L. 1809, P.L. 1824.
Enema Tabaci, P.L. 1836.

Take of Tobacco a scruple,
Water, boiling, half a pint;
Macerate for an hour, and strain.

Remarks.—Tobacco is the leaf of a plant belonging to the natural family *Solanaceæ*; the fresh leaves contain nicotina, nicotianin or tobacco camphor, bitter extractive, gum, chlorophylle, albumen, gluten, malic and citric acids, lignin, salts of potash, lime and ammonia, silica and water, to which some analysts would add tannic and gallic acids, a yellow oil and resin, a substance analogous to morphia, an orange red colouring matter, and Nicotic or Tabacic acid, the existence of which is however somewhat doubtful. Of these principles, the most active are Nicotianin and

Nicotina, which exists in large quantities in tobacco and may be procured by digesting the extract of the leaf with spirit, treating this tincture, when concentrated, with solution of potash, and afterwards with ether, which dissolves the crude nicotina. To this solution powdered oxalic acid should be added, which combining with the nicotina forms a heavy liquid; this, after treatment with fresh ether and subsequently with potash, must be heated in the presence of hydrogen gas, at a temperature of 284°, which drives off all the volatile impurities. When the temperature is raised to 356° pure Nicotina distils over. This is liquid, colourless, with an acrid smell and taste, does not solidify at 20°, boils at 474°, when it decomposes; it exhibits alkaline reactions, combines with several acids to form salts, and also with some salts to form double salts, is soluble in water, alcohol, ether, and in oils. It dilates the pupil of the eye and is a most active poison. Nicotina, according to the analysis of Melsens, which has since received ample confirmation, although it has been proposed to double the formula, consists of

Twenty equivalents	of Carbon	$6 \times 20 =$	120	or	74·08
Fourteen ,,	of Hydrogen ..	$1 \times 14 =$	14	,,	8·64
Two ,,	of Nitrogen ..	$14 \times 2 =$	28	,,	17·28
		Equivalent......	162.		100·

Formula...... $C^{20} H^{14} N^{2}$.

Nicotianin exists in dried tobacco, it is solid, volatile, and insoluble in water, but dissolves in ether and the fixed alkalis; it does not appear to be so poisonous as Nicotina.

Adulterations and Tests.—Sugar, treacle, honey, various vegetables, liquorice, salts of various kinds, and earthy matter; but it is not necessary here to describe the proper tests, as any adulteration of the tobacco used for making the enema is not likely to materially affect its action.

Medicinal Use.—This very drastic and most dangerous enema is recommended in cases of hernia, but with doubtful success. It ought never to be employed unless under very competent advice. The present preparation has again been reduced in strength.

ENEMA TEREBINTHINÆ.

Enema of Turpentine.

Enema Terebinthinæ, P.L. 1836.

Take of Oil of Turpentine a fluidounce,
The yelk of one Egg,
Decoction of Barley nineteen fluidounces;
Rub the Oil with the Yelk, and mix in the Decoction.

Remarks.—Yelk of Egg contains a large quantity of oil, a crystalline fat, and albumen containing much phosphorus, and a little free alkali. Its only use in this enema is to render the oil of turpentine miscible with the barley-water.

Medicinal Use.—Employed in cases of intestinal worms, chiefly of tænia, and likewise in some spasmodic affections, as in chorea.

EXTRACTA.

EXTRACTS.

In preparing Extracts, unless otherwise ordered, evaporate the water as quickly as possible, by a water-bath, in a pan, stirring constantly with a spatula towards the end until a proper consistence is acquired for forming pills.

Note.—Extracts are those preparations which are obtained when vegetable substances are boiled in water, or have their soluble parts dissolved in spirit of wine, or when the expressed juices of recent plants are boiled down to a proper consistence for forming into pills; and in some cases, the evaporation is carried so far that the extract is reducible to powder.

As the medicinal power of some vegetable substances resides, to a certain extent, in principles which are insoluble in water, but dissolve in spirit of wine, different modes of operating are adopted; in the first case, that is, when the virtues of the medicines are completely soluble in water, such for example as those of gentian, the extract is termed a watery extract; when the vegetable contains resinous or other matter insoluble in water, it is extracted by spirit, and is then termed a spirituous extract; while the expressed juices of recent plants, when evaporated to a proper degree, were formerly called inspissated juices, but they are now classed by the College with the extracts.

That part of vegetable bodies which is soluble in water, and reduced by evaporation to the state of extract, has, on this account, received the name of extractive matter, extract or extractive; it is evident, however, that these extracts consist of all the various substances soluble in water, and they must therefore contain very different ingredients; in some these are neutral, such as *colocyntin*, the peculiar principle of colocynth; but others contain vegetable salts; for example the extracts of cinchona contain *kinate of cinchonia* and *kinate of quina*, extract of opium contains *meconate of morphia*, &c.; their medicinal powers depending generally, if not entirely, on the alkaloid.

EXTRACTUM ACONITI.

Extract of Aconite.

Extractum Aconiti, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Aconite Leaves, fresh, a pound,

Bruise them in a stone mortar; then press out the juice, and evaporate it, unstrained, to a proper consistence.

Remarks.—Aconite or Monkshood is a well-known plant belonging to the natural family *Ranunculaceæ.* The root, leaves, flowers and seeds of this plant have a biting taste, followed by tingling and numbness of the lips, tongue, and throat; the leaves gradually lose these properties as the seeds begin to form, and when these are ripe, the leaves have completely lost this peculiar quality, whilst the seeds possess it in an eminent degree, being extremely acrid. These properties are referable to an alkaloid, Aconitina, which was inserted in the last Pharmacopœia, but is now omitted, the Tinctura Aconiti being substituted for it.

Aconitina is obtained by treating a spirituous extract of the roots with diluted sulphuric acid, decolorizing this solution with animal charcoal, and then adding solution of ammonia which precipitates the Aconitina*. This alkaloid may be crystallized from its solution in spirit; it is soluble in water, alcohol, and ether, and combines with acids to form salts; it fuses at 176°, and decomposes at above 248°. It consists of

Sixty equivalents	of Carbon	$6 \times 60 = 360$	or	67·54
Forty-seven ,,	of Hydrogen	$1 \times 47 = 47$	,,	8·82
One ,,	of Nitrogen	14	,,	2·63
Fourteen ,,	of Oxygen	$8 \times 14 = 112$	,,	21·01
	Equivalent......	533.		100·

Formula...... $C^{60} H^{47} N O^{14}$.

Aconitina is a most powerful poison, and probably exists in the plant combined with *Aconitic Acid*, which is also met with in some other vegetables, often combined with lime, forming aconitate of lime. An acrid volatile principle has also been stated to exist in aconite which has not been isolated, and which Dr. Pereira considers may have been derived from the decomposition of the Aconitina.

Pharmacopœia Preparations.—Extractum Aconiti, Tinctura Aconiti.

Medicinal Uses.—Of the Extract, Narcotic: useful in Neuralgia and Rheumatism; in some cases diuretic. The dose should not at first exceed half a grain; but it may be gradually increased to gr. v. This extract is of a brown colour; it has a disagreeable smell and an acrid taste.

EXTRACTUM ALOES.

Extract of Aloes.

Extractum Aloës, P.L. 1809.
Extractum Aloës Purificatum, P.L. 1809, edit. alt., P.L. 1824, P.L. 1836.

Take of Socotrine Aloes fifteen ounces,
Distilled Water, boiling, a gallon;

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* This process of the last Pharmacopœia, although defective, from the inevitable waste attending it owing to the solubility of the Aconitina in water, is so far good that I have always obtained this alkaloid by it, having been careful in selecting sound, heavy, and properly dried roots.—Ed.

Macerate for three days with a gentle heat; afterwards strain, and set by that the dregs may subside. Pour off the clear liquor, and evaporate it to a proper consistence.

Remarks.—SOCOTRINE ALOES is the inspissated juice of a plant belonging to the natural family *Liliaceæ*; this description of Aloes has long been regarded as the best, and was originally obtained (as its name indicates) from the island of Socotra, but is now annually imported from Bombay in chests, casks or kegs. Its colour is reddish-brown, which becomes darker by exposure to the air, and bright yellow by pulverizing. Its fracture is smooth, conchoidal, glossy and pellucid; the taste is very bitter, and the smell aromatic and pleasant, especially when heated or burnt; by distillation with water a liquid is obtained which has the fragrance without the bitterness of the aloes. See also MATERIA MEDICA: *Aloe Socotrina.*

Cold water, according to M. E. Robiquet, dissolves 1–36th of its weight, and the solution even when filtered is not perfectly transparent; by exposure to the air it absorbs oxygen, becomes clear and of a very rich purple colour. It is soluble in almost every proportion in alcohol, but very imperfectly in ether. At 158° Socotrine aloes softens, and at 167° completely melts.

The specimen examined by M. Robiquet consisted of

Pure Aloes	85·00
Ulmate of Potash	2·00
Sulphate of Lime	2·00
Gallic Acid	·25
Albumen	8·00
Loss, &c.	2·75
Traces of Carbonate and Phosphate of Lime.	
	100·

Aloetin, which possesses in a high degree the purgative properties and bitter taste of the commercial juice, is obtained from Socotrine aloes by a somewhat circuitous process, in the form of almost colourless scales, which are very soluble in water; this substance contains no nitrogen, and is probably a compound of two or more substances, and I therefore do not subjoin its composition. Its aqueous solution, when exposed to air, acquires an intense purple tint which dyes silk and woollen of an orange-brown colour.

Impurities, Adulterations, and Tests.—Socotrine aloes is not often adulterated; if mixed with the inferior kinds, the odour it exhales when breathed on or gently heated, will detect the admixture.

Pharmacopœia Preparations.—Extractum Aloes, Pilula Aloes Composita, Pilula Rhei Composita. See also HEPATIC ALOES.

Pharmacopœia Preparations of the Extract.—Decoctum Aloes Compositum, Pilula Colocynthidis Composita.

Medicinal Uses.—Purgative, stomachic. Dose, gr. v. to gr. xv.

EXTRACTUM ALOES BARBADENSIS.

Extract of Barbadoes Aloes.

Make this in the same way in which EXTRACT OF ALOES is ordered to be prepared.

Remarks.—BARBADOES ALOES, like the above, is the inspissated juice of a plant belonging to the natural family *Liliaceæ.* This variety was formerly prepared from the *Aloe vulgaris* in Barbadoes, but it is now said to be procured from other species and in other of the West India Islands. It is obtained by immersing repeated quantities of the chopped leaves of the tree in boiling water, and evaporating the clear decoction until it is sufficiently concentrated to solidify in the gourd shells into which it is put for exportation.

This description of aloes varies in colour from a dark brown or black, (*brown* or *black Barbadoes aloes,*) to a reddish brown or liver colour (*liver-coloured* or *hepatic Barbadoes aloes*): even in the same gourd a difference of colour is occasionally observed. The fracture also varies, sometimes being dull, at other times glossy. Its unpleasant odour (which is much increased by breathing on it) will always distinguish it from Socotrine or Hepatic Aloes. See also MATERIA MEDICA: *Aloe Barbadensis.*

Aloin, as the cathartic principle of this variety and probably of every kind of aloes has been termed by its discoverers, is represented as possessing properties which render it likely that the Aloetin described under Extractum Aloes, is really Aloin in an impure state. Aloin is obtained by setting aside, for a few days, the liquid extract of Barbadoes Aloes evaporated *in vacuo,* when it becomes loaded with granular crystals. These are separated by pressure, and purified by solution in water and recrystallization out of contact with air. It crystallizes in yellowish satiny tufts of rhombic plates from its spirituous solution; it is intensely bitter and aloetic in taste, but inodorous: it exerts no action on test-papers, is soluble in water, lime-water and solution of potash; in acetic acid and acetic ether it dissolves readily, but only sparingly in ether. It consists, according to Dr. Stenhouse's analysis, of

Thirty-four equivalents	of Carbon..	6×34=204	or 61·07
Eighteen ,,	of Hydrogen	1×18= 18	,, 5·40
Fourteen ,,	of Oxygen..	8×14=112	,, 33·53
	Equivalent......	334·	100·

Formula...... $C^{34} H^{18} O^{14}$.

The Aloin, dried *in vacuo*, is a hydrate of the above containing one equivalent of water.

Impurities, Adulterations, and Tests.—Both Barbadoes and Socotrine Aloes are usually very impure, containing much feculent and inert matter, on which account these extracts have been directed to be prepared for use in lieu of the crude drugs. Adulteration is not usual, excepting that which is due to inferior specimens of the drug. When 15 grs. of aloin is added to ♏xxx. of nitric acid, and the product dissolved in water is neutralized with potash, an intense and beautiful red-coloured liquid is produced, which appears to be a good characteristic test of this substance.

Pharmacopœia Preparations.—Enema Aloes (?), Extractum Aloes Barbadensis.

Pharmacopœia Preparation of the Extract.—Pilula Aloes cum Sapone.

Medicinal Uses.—See EXTRACTUM ALOES.

HEPATIC ALOES is also the juice of a plant belonging to the same natural order as the source of the preceding extract, and I insert some remarks upon it in this place so as to describe the various officinal kinds of Aloes together, although no extract of this variety is ordered. Hepatic Aloes, so named from its usual liver-brown colour, is imported from Bombay in skins contained in casks. Its odour is much less disagreeable than that of Barbadoes aloes, but more so than that of Socotrine aloes, from which last it is best distinguished by its opacity and liver colour. It has a dull, somewhat waxy fracture, and a nauseous intensely bitter taste. From their similarity of smell Dr. Pereira suspects that hepatic aloes is obtained from the same tree as Socotrine aloes, an idea which is supported by the fact, that both kinds sometimes occur in the same cask. Hepatic aloes is yellow when reduced to powder; by digestion in spirit of wine, a yellowish granular powder is obtained, which is insoluble in water, but readily dissolves in a solution of potash, forming a red-coloured liquid. See also MATERIA MEDICA: *Aloe hepatica.*

For *Chemical Properties* and *Composition*, and *Adulterations* and *Tests*, see EXTRACTUM ALOES, and EXTRACTUM ALOES BARBADENSIS, which it resembles in its chemical characteristics.

Pharmacopœia Preparations.—Pilula Aloes cum Myrrha, Pilula Cambogiæ Composita, Pulvis Aloes Compositus, Tinctura Aloes, Tinctura Aloes Composita, Vinum Aloes. In all these preparations either Hepatic or Socotrine Aloes may be used.

Medicinal Uses.—See EXTRACTUM ALOES.

EXTRACTUM BELLADONNÆ.

Extract of Belladonna [*Deadly Nightshade*].

Extractum Belladonnæ, P.L. 1809, P.L. 1824, P.L. 1836.

This is to be made by the same method which is ordered for EXTRACT OF ACONITE.

Remarks.—See ATROPIÆ SULPHAS. The medicinal virtues of the leaf, like those of the root, depend chiefly upon the presence of Atropia.

Pharmacopœia Preparation.—Emplastrum Belladonnæ.

Medicinal Use.—See ATROPIÆ SULPHAS.

EXTRACTUM CINCHONÆ.

Extract of Cinchona. [*Yellow Cinchona Bark*].

Extractum Cinchonæ Cordifoliæ, P.L. 1836.

Take of Yellow Cinchona Bark, coarsely bruised, three pounds,
Distilled Water six gallons;

Add four pints of Water to the Bark, and stir continually with a spatula until it is thoroughly moistened; macerate for twenty-four hours, and strain through linen. Macerate what remains in the rest of the Water for twenty-four hours, and strain. Then evaporate the united solutions to a proper consistence.

EXTRACTUM CINCHONÆ PALLIDÆ.

Extract of Pale Cinchona.

Extractum Corticis Peruviani, P.L. 1746, P.L. 1788.
Extractum Cinchonæ, P.L. 1788, edit. alt., P.L. 1809, P.L. 1824.
Extractum Cinchonæ Lancifoliæ, P.L. 1836.

EXTRACTUM CINCHONÆ RUBRÆ.

Extract of Red Cinchona.

Extractum Cinchonæ Oblongifoliæ, P.L. 1836.

Prepare these in the same manner in which EXTRACT OF CINCHONA is directed to be made.

For *Remarks*, see DECOCTUM CINCHONÆ, DECOCTUM CINCHONÆ RUBRÆ.

Medicinal Uses.—Tonic, stomachic. Dose, gr.x. to gr.xxx.

EXTRACTUM COLCHICI.

Extract of Colchicum [*Meadow Saffron*].

Extractum Colchici Cormi, P.L. 1836.

Take of the fresh Cormus of Meadow Saffron a pound; Strip off the outer coat, and finish in the same way as directed for EXTRACT of ACONITE.

Remarks.—See ACETUM COLCHICI.

Medicinal Uses.—Given in doses of one grain every four hours, it has been found most efficient in several forms of acute rheumatism, particularly in its earliest stage.

EXTRACTUM COLCHICI ACETICUM.

Acetic Extract of Colchicum [*Meadow Saffron*].

Extractum Colchici Aceticum, P.L. 1836.

Take of the fresh Cormus of Meadow Saffron a pound,
Acetic Acid three fluidounces;

Bruise the Cormus, stripped of its coat; gradually sprinkle with the Acetic Acid; then press out the juice, and evaporate it unstrained to a proper consistence.

Remarks.—The use of the acetic acid is to render the salt of colchicia, which the meadow saffron contains, more soluble. See Acetum Colchici.

Medicinal Uses.—It has been much employed in cases of acute rheumatism and gout, in dose of gr. j. to gr. ij. twice or thrice a day.

EXTRACTUM COLOCYNTHIDIS.

Extract of Colocynth.

Extractum Colocynthidis, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Colocynth, cut in pieces and deprived of its seeds, three pounds,
Distilled Water half a gallon;

Macerate the Colocynth for thirty-six hours, frequently squeezing it with the hand. Press out the liquor strongly, and finally evaporate to a proper consistence.

Remarks.—Colocynth is the fruit of a creeping plant belonging to the natural order *Cucurbitaceæ.* The pulp freed from seeds is the part of the fruit employed in medicine, and is imported from Cyprus and Egypt. This is light and spongy, of a dirty white or yellowish colour and most nauseous taste. Colocynth contains a peculiar purgative principle, which is obtained by treating the aqueous extract with diacetate of lead, then with sulphuric acid to remove any lead in solution, evaporating this solution to a hard extract, and treating this with rectified spirit, which first dissolves and by evaporation affords

Colocynthin, which is an oily fluid at 212°, and a reddish brown resinous substance at ordinary temperatures. It is soluble in water, alcohol, dilute acids and alkalis, possessing neither basic nor acid properties.

Incompatibles.—Tincture of galls, and most soluble salts of iron, copper and mercury.

Pharmacopœia Preparations.—Enema Colocynthidis, Extractum Colocynthidis, Pilula Colocynthidis Composita.

Medicinal Use.—Extract of Colocynth is purgative. Dose, gr. v. to gr. xx.

EXTRACTUM CONII.

Extract of Conium [*Hemlock*].

Succus Cicutæ Spissatus, P.L. 1788.
Extractum Conii, P.L. 1809, P.L. 1824, P.L. 1836.

This is to be prepared in the same manner as we direct EXTRACT OF ACONITE to be made.

Remarks.—HEMLOCK is an indigenous plant belonging to the natural family *Umbelliferæ*, all parts of which, but especially the leaves and seeds, contain the singular liquid alkaloid called

Conia, the best method of procuring which is to add to the bruised seeds eight times their weight of dilute solution of potash, and distil so long as the distillate has any smell; this neutralized by dilute sulphuric acid is to be evaporated to a syrup, which when treated with a mixture of 1 part of ether and 2 parts of rectified spirit, yield to it the sulphate of conia; this solution is to be evaporated to dryness. The product must then be rapidly distilled with a strong solution of potash, which affords conia, which may be rectified from lime, and then dried by being placed *in vacuo* over sulphuric acid. Conia is a colourless transparent oily liquid of specific gravity 0·878 to 0·89; it is volatile, and its vapour irritates the eyes; its smell is penetrating and disagreeable, resembling when diluted that of mice. It is soluble in alcohol, ether, and oils; it exerts when mixed with water a powerful alkaline action on test-papers, which disappears again on the application of heat; it dissolves sulphur, and chloride of silver, coagulates albumen, and precipitates the salts of copper, lead, zinc, iron, manganese, and alumina, but exerts no action on the salts of the alkaline earths. Cold water dissolves one per cent. of conia, which solution becomes turbid when heated; it distils at 370°, and forms salts with the acids which are mostly deliquescent, and give saffron-yellow coloured precipitates with iodine, and white ones with tannic acid. It is a most powerful poison.

This alkaloid has been examined by Geiger, Liebig, and Ortigosa, and more recently by Dr. Blyth, who regards it as consisting of

Seventeen equivalents of Carbon	$6 \times 17 = 102$	or 76·69
Seventeen ,, of Hydrogen ..	$1 \times 17 = 17$	,, 12·48
One ,, of Nitrogen..........	14	,, 10·83
Equivalent........	133.	100·

Formula...... $C^{17} H^{17} N$.

but which differs somewhat from the results afforded by analysis. Dr. Wagner prefers the formula $C^{16} H^{15} N$, but solely on theoretical grounds; it agrees less than the above with the actual results of analysis.

Pharmacopœia Preparations.—Of the Extract, Cataplasma Conii, Pilula Conii Composita. Of the Leaves, Extractum Conii, Tinctura Conii, Unguentum Conii.

Medicinal Uses.—Anodyne. In doses of five grains every eight hours, and gradually increased to the same quantity every four hours, or until headache or sense of constriction across the forehead supervene: it has been successfully employed in cases of acute rheumatism in its more advanced stages. It is likewise of service in hooping-cough.

EXTRACTUM ELATERII.

Extract of Elaterium [*Wild Cucumber*].

Elaterium, P.L. 1721, P.L. 1746, P.L. 1788.
Extractum Elaterii, P.L. 1809, P.L. 1824, P.L. 1836.

Take of wild Cucumbers a pound;

Slice the wild Cucumber lengthwise, and strain the juice, very gently expressed, through a very fine hair sieve; then set it by for some hours, until the thicker part has subsided. The thinner supernatant part being rejected, dry the thicker part with a gentle heat.

Remarks.—This plant belongs to the natural family *Cucurbitaceæ*; its extract has a greenish colour, with a bitter and rather acrid taste; when tolerably pure, it is light, pulverulent and inflammable. The late Mr. Hennell informed me, that if the juice be too long exposed it is apt to undergo fermentation, which must not be suffered to take place. The extract should be dried on blotting paper. Its properties have been particularly examined by the President of the College of Physicians, and according to his experiments, they reside in a peculiar substance, which he has called *elatin*.

The Extract of Elaterium has also been examined by Hennell and Zwenger, from which the latter obtained *Elaterin*, which appears to be a neutral substance, consisting of carbon, hydrogen, and oxygen, the composition of which cannot be regarded as determined: it melts at 392°, is insoluble in water, soluble in alcohol, but sparingly so in ether, and crystallizes in hexagonal prisms.

Extractum Elaterii yielded by analysis

Elatin (green resinous extract) ..	17
Bitter principle................	44
Starch	6
Woody fibre	27
Earthy matter	7
	101.

Medicinal Uses.—Hydragogue. Cathartic. Dose, from one-sixteenth of a grain to two grains. It should be most cautiously administered.

EXTRACTUM GENTIANÆ.

Extract of Gentian.

Extractum Gentianæ, P.L. 1746, P.L. 1788,
P.L. 1809, P.L. 1824, P.L. 1836.

Take of Gentian, sliced, three pounds,
Distilled Water six gallons;

Macerate for twelve hours in four gallons of the Water, pour off the solution, and strain. Add the two gallons of Water to the residue, macerate for six hours, gently press out the solution, and strain. Lastly, evaporate the solution, mixed together to a proper consistence.

Remarks.—GENTIAN is the root of a mountainous plant indigenous to central Europe, belonging to the natural family *Gentianaceæ.* The extract is of a dark colour, has but little smell, and possesses a strong though not a disagreeable bitter taste. It is tonic and stomachic, though seldom employed alone, but chiefly as a vehicle for, or adjunct to, certain mineral tonics, as the preparations of iron or zinc. Good Gentian is stated by Mr. Brande to yield half its weight of extract.

Gentian Root appears to contain several different substances: 1st. A volatile odorous principle, owing to which it is stated that the distilled water has a strong smell and a sharp taste, and produces nausea and a kind of intoxication. 2nd. *Gentianin*: this is procured by washing the spirituous extract of the root with water, and then treating the light brown flakes which separate with alcohol; by evaporating this solution and treating the residue with ether and alcohol, gentianin is obtained in pale yellow needle-form crystals, which have a weak but peculiar smell, and no taste. It is nearly insoluble in water, but dissolved by alcohol. It may be partially vaporized without decomposition, and unites with both acids and bases. It produces no effect on the solution of acetate of lead or nitrate of silver; but chloride of iron and the salts of copper produce characteristic changes in the alcoholic solution.

Gentianin consists of

Fourteen equivalents	of Carbon	6 × 14 = 84	or 65·11
Five ,,	of Hydrogen..	1 × 5 = 5	,, 3·87
Five ,,	of Oxygen....	8 × 5 = 40	,, 31·02
	Equivalent......	129.	100·

Formula...... $C^{14} H^{5} O^{5}$.

Gentian root yields but very little Gentianin. 3rd. *Gentianite,* the bitter principle of gentian, has not been obtained in a separate state. It is procured by digesting the spirituous extract of gentian in water, and after separating the gentianin, a liquid is obtained, which by evaporation yields a sweet and a very bitter extract, from which ether separates wax, resin, and fatty matter, but not the sugar. 4th. *Pectin,* or *Pectic Acid,* is the substance to which the gelatinization of infusion of gentian is owing, whenever it occurs. 5th *Sugar.* To the presence of this may be ascribed the vinous fermentation which the infusion of gentian is capable of undergoing, and by which an alcoholic liquor (*Gentian spirit*) is procured.

Impurities, Adulterations, and Tests.—Roots of other varieties of Gentian are frequently intermixed with those of the officinal root. The roots of other, and even of poisonous plants, as of Aconite, Belladonna, and White Hellebore, are also sometimes found in the gentian of commerce. These last are readily detected, as they possess neither the taste nor colour of the true root. Yellow ochre, and other inert substances, are sometimes mixed with the powdered root; incineration of a small quantity of the suspected powder will yield a large proportion of red ash if yellow ochre has been used.

Pharmacopœia Preparations.—Of the Extract, Pilula Aloes Composita. Of the Root, Extractum Gentianæ, Infusum Gentianæ Compositum, Tinctura Gentianæ Composita.

Medicinal Uses.—Tonic. Stomachic. Dose, gr. x. to gr. xxx. twice or thrice a day. It is frequently exhibited with chalybeates.

EXTRACTUM GLYCYRRHIZÆ.

Extract of Liquorice.

Extractum Glycyrrhizæ, P.L. 1746, P.L. 1788,
P.L. 1809, P.L. 1824, P.L. 1836.

Take of fresh Liquorice [root], bruised, two and a half pounds,
Distilled Water, boiling, two gallons;

Macerate for twenty-four hours, then boil down to a gallon, and strain the solution whilst hot; lastly, evaporate to a proper consistence.

Remarks.—This root is obtained from a plant now largely cultivated in this country, belonging to the natural family *Leguminosæ.* The foreign extract, *Spanish Liquorice,* is mostly imported from Italy. This root contains a peculiar principle termed *glycyrrhizin,* which is procured by precipitating a concentrated and clear solution of the extract by sulphuric acid, and washing the precipitate first with acidulated, and then with pure water. The glycyrrhizin, thus purified, is slightly soluble in cold, but readily dissolves in boiling water, which solution gelatinizes in cooling: it is very soluble in alcohol; it reddens litmus strongly, and combines so readily with the alkalis, earths, and metallic oxides, that it should be ranked with the vegetable acids as *glycyrrhizic acid*; it most probably exists in the root combined with lime or ammonia. Like Mannite and Orcin, although sweet to the taste, Glycyrrhizin is not susceptible of the vinous fermentation; it is composed of

Eighteen equivalents	of Carbon	$6 \times 18 =$	108	or	61·01
Thirteen ,,	of Hydrogen ..	$1 \times 13 =$	13	,,	7·35
Seven ,,	of Oxygen	$8 \times 7 =$	56	,,	31·64
	Equivalent		177·		100·

Formula ...... $C^{18} H^{12} O^{6}$, HO.

Adulterations and Tests.—Extract of liquorice is largely adulterated with starch, or with coarse sugar; solution in water, washing the sediment, and treating it with water at about 170°; and this solution with tincture of iodine, will detect the starch, and the vinous fermentation of the solution, on the addition of a little yest, will indicate the presence of sugar. Liquorice powder is said to be adulterated on the continent with French Yellow, which is detected by its effervescing on the addition of an acid.

Pharmacopœia Preparations.—Of the Extract, Decoctum Aloes Compositum, Pilula Aloes cum Sapone, Tinctura Aloes. Of the Root, Confectio Sennæ, Decoctum Hordei Compositum, Decoctum Sarsæ Compositum, Extractum Glycyrrhizæ, Infusum Lini Compositum, Pilula Hydrargyri, Pilula Saponis Composita, Tinctura Rhei Composita.

Medicinal Uses.—Emollient and demulcent in coughs and bronchial affections.

EXTRACTUM HÆMATOXYLI.

Extract of Logwood.

Extractum Ligni Campechensis, P.L. 1746, P.L. 1788.
Extractum Hæmatoxyli, P.L. 1788, edit. alt. P.L. 1809, P.L. 1824, P.L. 1836.

Take of Logwood, sliced, two pounds and a half,
Distilled Water, boiling, two gallons.

Make this extract in the same manner which is directed for EXTRACT OF LIQUORICE.

Remarks.—LOGWOOD is the central portion of a tree belonging to the natural family *Leguminosæ*; this wood when in chips has a slight pleasant scent, red colour, and sweet astringent taste. It contains *Hematin,* which exists in it in such quantities that beautiful red crystals are occasionally met with in fissures of the wood. It would appear from the researches of Erdmann that red hematin is derived from a principle existing in logwood, crystallizing in quadrangular prisms of a pale yellow colour, which may be obtained by treating the powdered hard extract by ether, distilling the ethereal solution to a syrup, diluting this with water, and exposing it to spontaneous evaporation, when the crystals of *hæmatoxylin* deposit in considerable quantities. This substance appears to belong to the class of colouring matters contained in the lichens, being colourless in itself, but becoming coloured by exposure to air and combination with bases, especially with ammonia. Hæmatoxylin tastes like liquorice juice; it is slightly soluble in cold, and very soluble in boiling water. Atmospheric air exerts no action upon it unless it contain ammoniacal vapour, the slightest trace of which reddens it. When treated with ammonia, and its solution exposed to air, more ammonia being added from time to time, it absorbs oxygen, and forms a cherry-red solution of so intense a shade as to be almost black, from which *hematin* may be procured; this is a reddish brown substance very slightly soluble in cold water, more so in boiling water, and in alcohol; potash produces a blue colour passing into brown with it, and ammonia gives with it a magnificent purple-red colour. It would seem that hematin is the result of the oxidation of one eq. of the hydrogen of the hæmatoxylin $C^{20} H^7 O^7$, becoming by exposure to air hematin $C^{20} H^7 O^7$.

Sulphurous and Hydrosulphuric Acids deoxidize solutions of hematin and of logwood, rendering them colourless, hæmatoxylin being reproduced.

This Extract becomes hard by keeping and unfit for use, pills when made of it in this state passing through the body unchanged.

Pharmacopœia Preparations.—Of the Wood, Decoctum Hæmatoxyli, Extractum Hæmatoxyli.

Medicinal Use.—Astringent in chronic diarrhœa and dysentery. Dose, gr. x. to gr. xxx. in some aromatic water.

EXTRACTUM HYOSCYAMI.

Extract of Hyoscyamus [*Henbane*].

Extractum Hyoscyami, P.L. 1809, P.L. 1824, P.L. 1836.

Make this in the same manner in which we have directed the Extract of Aconite to be prepared.

Remarks.—Henbane is an indigenous plant belonging to the natural family *Solanaceæ*; its extract contains narcotic, bitter, and gummy extractives, and several magnesian salts. The medicinal properties of the narcotic extract are due to *Hyoscyama*, the active principle of Henbane. This is an alkaloid closely resembling Atropia in its properties, crystallizing in silky tufts, forming salts with the alkalis, and giving a white precipitate with tincture of galls.

Pharmacopœia Preparations.—Extractum Hyoscyami, Tinctura Hyoscyami.

Medicinal Uses.—This extract is an excellent anodyne and antispasmodic, and possesses the advantage of not materially confining the bowels. Dose, gr. v. to gr. x. twice or thrice a day.

EXTRACTUM JALAPÆ.

Extract of Jalap.

Extractum Jalapii, P.L. 1746, P.L. 1788.
Extractum Jalapæ, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Jalap, powdered, two pounds and a half,
Rectified Spirit a gallon,
Distilled Water two gallons;

Macerate the Jalap Root in the Spirit for four days, and pour off the Tincture. Boil down the residue in the Water to half a gallon; afterwards strain the tincture and the decoction separately, and let the latter be evaporated, and the former distil, until each thickens. Lastly, mix the Extract with the Resin, and evaporate to a proper consistence.

This Extract should be kept *soft*, which may be fit to form pills, and *hard*, which may be rubbed to powder.

Remarks.—Jalap is the root of a plant belonging to the natural family *Convolvulaceæ*, the active principle of which is the Jalap-resin it contains; this when pure is transparent and colourless, soluble in alcohol, but insoluble in ether and in water. When heated with sulphuric acid jalap-resin assumes a rich crimson tint, which disappears on the addition of water. It consists of

Forty equivalents	of Carbon	$6 \times 40 = 240$	or 55·30
Thirty-four „	of Hydrogen	$1 \times 34 = 34$	„ 7·83
Twenty „	of Oxygen.	$8 \times 20 = 160$	„ 36·87
	Equivalent	434.	100·

Formula. . . . . . $C^{40} H^{34} O^{20}$.

By referring to Emplastrum Galbani, it will be seen that the base of Jalap-resin may be regarded as being of the same constitution as turpentine-resin, $C^{40} H^{30}$; oil of turpentine $= C^5 H^4$.

Jalap-resin is stated to contain *Jalapic Acid*, which is soluble in ether and the alkalis, but insoluble in acids. It will probably be found that Jalap-resin consists, like colophony, of two isomeric resins, differing in some of their properties.

Adulterations and Tests.—It is not often that this is adulterated with other roots; the fraud is too readily detected; but Jalap-resin is frequently sophisticated with other resins, especially that of Guaiacum; this mixture, when dissolved in alcohol and treated with a few drops of solution of hypochlorite of lime, will yield if adulterated with guaiacum-resin a green precipitate. This test may be useful to detect the same fraud in other resins, as in scammony-resin for instance.

Pharmacopœia Preparations.—Of the Extract, Pulvis Scammonii Compositus. Of the Root, Extractum Jalapæ, Pulvis Jalapæ Compositus, Tinctura Jalapæ.

Medicinal Uses.—Purgative. Dose of the Extract, gr. x. to gr. xx.

EXTRACTUM LACTUCÆ.

Extract of Lettuce.

Extractum Lactucæ, P.L. 1824, P.L. 1836.

Prepare this in the same manner in which we have directed the Extract of Aconite to be made.

Remarks.—The Lettuce of the Pharmacopœia is a plant belonging to the natural family *Compositæ*, which when the flowering stem shoots up abounds in a milky juice, and this inspissated yields the Extract of Lettuce, resembling in its properties *Lac-*

tucarium, which is the juice exuded from the wounded stem dried by exposure to air; this consists of *Lactucin*, a bitter acid, the Lactucic, Mannite, Asparagin, a substance resembling caoutchouc, resins, wax, albumen, ulmic acid, pectin and various salts. Lactucarium resembles opium in scent, and possesses a peculiar bitter taste. By digesting it in ether and spontaneous evaporation of the solution, *lactucin* is deposited in acicular crystals of a strong bitter taste, which may be partially volatilized without decomposition, and are soluble in water, alcohol and ether.

Medicinal Use.—A mild anodyne. Dose, gr. v. to gr. xx. two or three times a day.

EXTRACTUM LUPULI.

Extract of the Hop.

Extractum Humuli, P.L. 1809, P.L. 1824.
Extractum Lupuli, P.L. 1836.

Take of the Hop two pounds and a half,
Distilled Water, boiling, two gallons;

Prepare this Extract in the same manner in which we have directed the EXTRACT OF LIQUORICE to be made.

Remarks.—The HOP belongs to the natural family *Urticaceæ*, the catkins of which yield, besides other substances of little importance, a volatile oil and a bitter yellow powder, *lupulin*, in which indeed most of the oil resides, and which also contains resin, gum, bitter extractive, and various salts.

Medicinal Use.—Sedative. Dose, gr. v. to gr. xx.

EXTRACTUM NUCIS VOMICÆ.

Extract of Nux-Vomica.

Take of Nux-vomica eight ounces,
Rectified Spirit three pints.

Expose the Nux-vomica to steam to soften it. Afterwards cut it into thin slices, bruise and dry it; macerate this for seven days in two pints of the Spirit. Press out the Tincture and strain. Again macerate the residue in the remainder of the Spirit for three days, then again press out and strain. Distil the major part of the Spirit from the mixed tinctures; what remains is to be evaporated to a proper consistence.

Remarks.—Nux-vomica is the seed of an East Indian tree belonging to the natural family *Apocyanaceæ*; it is destitute of smell, but possesses a most acrid bitter taste, owing to the presence of the two alkaloids *Strychnia* and *Brucia*, which exist in the seed combined with Strychnic (Igasuric) acid, an acid Berzelius regards as identical with Lactic acid. Strychnia is in the present Pharmacopœia transferred to Materia Medica, and instead of the process for obtaining it inserted in the last, I shall detail a modification of it which possesses the advantage of affording brucia as well as strychnia.

Process.—Boil nux-vomica with spirit of wine, sp. gr. 0·94; pour off the solution, dry the nuts in a stove, when they may be easily powdered. Treat this powder with three or four successive portions of spirit, boiling each time; distil the spirit from the mixed solutions, and add acetate of lead to the residual liquid extract until it ceases to precipitate; this separates the fats, colouring matter, vegetable acids, &c. Evaporate the solution until its weight is somewhat less than half the weight of the nux-vomica employed, and add magnesia to this solution to the extent of one-sixtieth of the weight of the drug employed; stir this frequently, and then set aside for several days for the brucia to deposit. Collect and press the precipitate, mix again with cold water, and again press out the water, repeating this frequently so as to wash it thoroughly, then dry and powder the precipitate, and exhaust it with boiling spirit of sp. gr. 0·835. By distilling these alcoholic solutions the strychnia separates as a white crystalline powder, which may be still further purified by re-solution in spirit and re-crystallization; the brucia will remain in the residual solution. To separate the strychnia from the brucia with which it is mixed, dissolve this powder in diluted nitric acid, carefully avoiding excess of the latter; this solution, evaporated with a gentle heat, deposits nitrate of strychnia in acicular tufts perfectly pure and white, which are to be carefully separated. Afterwards the brucia salt crystallizes out, but a large portion will still remain uncrystallizable, so that the residual solution must be again treated with magnesia, alcohol, &c. to obtain it. When brucia is precipitated, the supernatant solution always retains a portion for some time, but deposits it in crystalline grains in some six or eight days.

Properties.—Strychnia was discovered by Pelletier and Caventou, and exists in several other drugs besides nux-vomica, usually associated with brucia. This alkaloid is colourless, inodorous, unalterable by exposure to the air; it is so extremely bitter as to impart that taste to 600,000 times its weight of water. It requires about 6600 times its weight of cold, and 2500 times its weight of boiling water for solution. It is insoluble in absolute alcohol or in ether; alcohol even of specific gravity 0·820 scarcely dissolves any when cold, but in diluted alcohol it is more soluble. By rapid evaporation of the alcoholic solution it is deposited in a granular state, but by spontaneous evaporation it is procured in octahedral and square prisms terminated by flat four-sided pyramids.

It acts like the alkalis on vegetable colours, and neutralizes acids, forming salts with them.

It is extremely poisonous, and should be most carefully dispensed. When heated it is decomposed, and yields the same products as similarly constituted compounds. As usually obtained it is mixed with *brucia*, another extremely powerful vegetable alkaloid.

Composition.—Strychnia has been frequently analysed by several of the most eminent continental chemists: the composition arrived at by that most accurate analyst Regnault is

Forty-four equivalents	of Carbon ..	6×44=264		or	75·86
Twenty-four ,,	of Hydrogen	1×24= 24		,,	6·90
Two ,,	of Nitrogen	14× 2= 28		,,	8·04
Four ,,	of Oxygen..	8× 4= 32		,,	9·20
	Equivalent		348.		100·

Formula...... $C^{44} H^{24} N^{2} O^{4}$.

Adulterations and Tests.—Nux-vomica is not often adulterated. Strychnia however usually contains some brucia, which alkaloid is coloured reddish-yellow by nitric acid, and this changes to a violet-blue on the addition of protochloride of tin. Strychnia, when triturated with peroxide of lead and sulphuric acid containing one per cent. of nitric acid, passes from blue to violet, then to red, and finally to a delicate yellow colour. Chromic acid or bichromate of potash and sulphuric acid afford a violet-blue with strychnia. See also MATERIA MEDICA: *Strychnia.*

Medicinal Uses.—In some cases of Paralysis. Dose of Extract of Nux-vomica, gr. ss. to gr. ij. Of Strychnia, $\frac{1}{12}$ of a gr.

Brucia crystallizes in colourless rhombs containing water; it is far more soluble in water than strychnia is, dissolving in 500 parts of boiling and 850 parts of cold water. It is very poisonous, though less so than strychnia; its taste is intensely bitter, it exerts an alkaline reaction, and forms crystallizable salts with acids.

EXTRACTUM OPII.

Extract of Opium.

Opium Colatum vel *Extractum Thebaicum*, P.L. 1721, P.L. 1746.
Opium Purificatum, P.L. 1788.
Extractum Opii, P.L. 1809, P. L. 1824.
Extractum Opii Purificatum, P.L. 1836.

Take of Powdered Opium a pound and a half,
Distilled Water five pints;

Add gradually two pints and a half of the Water to the Opium, and macerate for twenty-four hours, frequently stirring with a spatula; then strain. Macerate the residue in the remainder of the Water for twenty-four hours and strain. Lastly, evaporate the strained solutions to a proper consistence.

Pharmacopœia Preparations.—Emplastrum Opii, Vinum Opii.

Medicinal Use.—The form of extract is preferable to that of tincture when it is intended to continue the operation of the medicine and not to obtain its full effects at once. Dose for an adult, gr. j. to gr. v.

Remarks.—Opium is the dried milky juice which exudes from incisions made in the capsules of the *Papaver somniferum*, a plant belonging to the natural family *Papaveraceæ*. This drug is remarkable for the number of distinct proximate principles which have been obtained from it; these are

	Formulæ.
Morphia	$C^{35} H^{20} N O^{6}$.
Codeia	$C^{36} H^{21} N O^{6}$.
Thebaia	$C^{25} H^{14} N O^{3}$.
Narceia	$C^{28} H^{20} N O^{12}$.
Papaverina	$C^{40} H^{21} N O^{8}$.
Pseudomorphia or Phormia	$C^{24} H^{18} N O^{12}$?.
Porphyroxin or Opin	not analysed.
Meconin	$C^{20} H^{9} O^{7} + HO$.
Narcotin	$C^{46} H^{25} N O^{14}$.
Meconic Acid (crystals)	$C^{14} H O^{11}, 3HO + 6HO$.

Of these, the first six, but more especially the three first, possess alkaline properties; the three following are neutral, and the last is an acid. Besides these proximate principles opium contains several substances common to many vegetables, as gum, caoutchouc, lignin, &c. Of the above list I shall only give a full description of

Morphia, as that alone is medicinally of much importance. Morphia is now omitted from the Pharmacopœia, and both its acetate and hydrochlorate are transferred from the "Alkalis" to Materia Medica. The process given below is that directed in the last Pharmacopœia for making hydrochlorate of morphia, from which the alkaloid may be prepared by precipitation with ammonia, and crystallizing the dried precipitate from its alcoholic solution. Numerous methods have been detailed for obtaining this alkaloid, but as this process does not require that expensive solvent, spirit of wine, and yields a very pure and beautiful salt, I have deemed it expedient to retain it.

MORPHIÆ HYDROCHLORAS, P.L. 1836.

Hydrochlorate of Morphia.

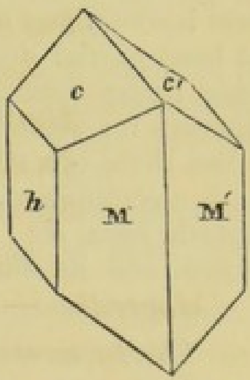
Take of Opium, sliced, a pound,
Crystals of Chloride of Lead two ounces, or as much as may be sufficient,
Purified Animal Charcoal three ounces and a half,
Hydrochloric Acid,
Distilled Water,
Solution of Ammonia, each as much as may be sufficient;

Macerate the Opium in four pints of distilled Water for thirty hours, and bruise it; afterwards, being digested for twenty hours more, press it. Macerate what remains again and a third time in water, that it may become free from taste, and as often bruise and press it. Evaporate the mixed liquors, with a heat of 140°, *to the consistence of a syrup. Then add three pints of distilled Water, and when all the dregs have subsided pour off the supernatant liquor. Gradually add to this two ounces of Chloride of*

Lead, or as much as may be sufficient, first dissolved in four pints of boiling distilled Water, till nothing more is precipitated. Pour off the liquor and wash what remains frequently with distilled Water. Next evaporate the liquors mixed together, with a gentle heat, as before, that crystals may be formed. Press these in a cloth, then dissolve them in a pint of distilled Water, and digest with an ounce and a half of Animal Charcoal, in a heat of 120°, *and strain. Lastly, the Charcoal being washed, evaporate the liquors cautiously that pure crystals may be produced. To the liquor poured off from the crystals first separated, a pint of water being added to it previously, gradually pour in, frequently shaking it, as much Solution of Ammonia as may be sufficient to precipitate all the Morphia. To this, washed with distilled Water, add Hydrochloric Acid, that it may be saturated: afterwards digest it with two ounces of Animal Charcoal, and strain. Finally, the Charcoal being thoroughly washed, evaporate the liquors cautiously, that pure crystals may be produced.*

Properties.—MORPHIA in crystals obtained by spontaneous evaporation from alcohol has a pearly lustre, and its primary form is a *right rhombic prism*, the lateral planes only of which appear on the crystals; one cleavage only has been obtained parallel to the plane *h*.

	°	′
M on M′	127	20
M on *h*	116	20
h on *c*	132	20
c on *c*′	95	20



When precipitated from solutions of its salts, Morphia is first thrown down in white flocculi, which on stirring and standing assume an arenaceous form. It then contains water, which it loses when heated to 266°, becoming white and opaque. It requires 1000 parts of cold, and about 400 of boiling water to dissolve it; these solutions restore the blue tint of reddened litmus, and render turmeric paper brown. 100 parts of alcohol of specific gravity 0·83 dissolve 7·5 parts of morphia when boiling, 2·5 of which crystallize as the solution cools. It is almost insoluble in ether, but dissolves both in the fixed and volatile oils. It is also soluble in soda and in potash, very slightly so in ammonia, and forms a soluble compound with hydrate of lime.

Composition.—This important alkaloid has been frequently analysed by the most skilful chemists of the present day, and yet its composition can scarcely be regarded as finally determined. The balance of authority however is in favour of its constitution being

Thirty-five equivalents of Carbon ..	6×35=210	or	71·91
Twenty " of Hydrogen	1×20= 20	,,	6·85
One " of Nitrogen	= 14	,,	4·80
Six " of Oxygen..	8× 6= 48	,,	16·44
Equivalent......	292.		100·

Formula...... $C^{35} H^{20} N O^{6}$.

The crystals contain two equivalents of water, consequently of crystallized morphia the formula is $C^{35} H^{20} N O^{6}, 2HO$.

Morphia possesses very marked and powerful basic properties, forming salts with the acids; it exists in opium combined with a peculiar acid, the Meconic, forming Meconate of Morphia. Two of these salts have been already mentioned as Pharmacopœia Preparations, viz. the Acetate and the Hydrochlorate of Morphia. See Alkalis.

Acetate of Morphia crystallizes from a solution of Morphia in Acetic Acid, with some difficulty, in nearly colourless radiating needles; during the evaporation of the solution a part of the acid is sometimes dissipated, and a portion of the acetate, suffering at least partial decomposition, becomes insoluble in water, morphia being deposited, which requires additional acetic acid to dissolve it; acetate of morphia is very soluble in water, especially when there is a slight excess of acetic acid, but less so in alcohol. It is decomposed, like the other salts of morphia, by ammonia, potash, soda, &c., the morphia being precipitated. It is decomposed, and its elements are totally dissipated by a strong heat.

Composition.—Acetate of Morphia is composed of

One equivalent of Morphia..........	292	or	82·95
One ,, of Acetic Acid	51	,,	14·50
One ,, of Water............	9	,,	2·55
Equivalent........	352.		100·

Formula...... $C^{35} H^{20} N O^{6}, C^{4} H^{3} O^{3}, HO$.

Hydrochlorate of Morphia, commonly called muriate of morphia, is a colourless, inodorous, bitter salt, which crystallizes in plumose acicular crystals; it is soluble in 16 to 20 times its weight of water, and when boiling water is saturated with it, a crystalline mass is formed as the solution cools. It is also soluble in alcohol, but less so than in water. It is totally decomposed and dissipated by exposure to a red heat.

This salt was formerly regarded as anhydrous, but Mr. Hennell believing the contrary to be the case, supplied me with some dried by exposure to the air, which tried in my laboratory, yielded 14·33 per cent. of water. Crystallized Hydrochlorate of Morphia therefore consists of

One equivalent of Morphia..........	292	or	76·24
One „ of Hydrochloric Acid..	37	„	9·66
Six „ of Water........9×6	54	„	14·10
Equivalent......	383.		100·

Formula...... $C^{35} H^{20} N O^{6}, H Cl, 6HO$.

Codeia is procured from the solution from which the morphia, &c. was in the first instance precipitated. It is obtained from its aqueous solution in octahedral crystals containing two equivalents of water. It forms perfectly neutral salts with acids, which are precipitated by tannic acid, but not by ammonia. Its solution is not reddened by nitric acid.

Thebaia is nearly insoluble in water, its solutions are alkaline, it forms salts with acids of an acrid and metallic taste. It crystallizes in colourless short rhombic prisms. Nitric acid first imparts a resinous character to it, and then dissolves it.

Narceia.—Crystallizes in delicate acicular crystals, dissolves in water, but is insoluble in ether; its solutions have no alkaline reaction, but it dissolves in acids; it is coloured blue by hydrochloric and nitric acids, but not by perchloride of iron.

Papaverina.—Forms confused acicular crystals, is insoluble in water, but readily so in boiling spirit; it restores the blue colour of reddened litmus, forms salts with the mineral acids, and the crystals become blue when treated with sulphuric acid.

Phormia, or *Pseudomorphia.*—Crystallizes in plates or scales; does not form well-defined salts with acids: in its other properties it resembles morphia.

Opin, or *Porphyroxin.*—Crystallizes in brilliant needles; is very soluble in spirit, ether and the dilute acids; has no alkaline reaction; its solutions in the mineral acids become red by boiling.

Meconin.—Slightly acrid to the taste, soluble in water, alcohol and ether, has no alkaline reaction, nor does it form salts with acids; when fused and exposed to the action of chlorine gas it becomes red.

Narcotin.—Forms colourless rhomboidal prisms, is tasteless, neutral to test-paper, soluble in alcohol and ether, which solutions are bitter, is not reddened by nitric acid, nor with sulphuric acid, unless it contains nitric acid, nor turned blue by perchloride of iron.

Meconic Acid.—Crystallizes in transparent micaceous scales, very soluble in water, tastes acid, forms salts with the alkalis, forms a bright blood-red solution with perchloride of iron, which is destroyed by heat or deoxidizing agents, the colours returning on exposure to air, and is blackened by perchloride of gold and a little solution of potash. The composition of these constituents of opium may be calculated from their formulæ already given.

Adulterations, Impurities, and Tests.—On account of its value and ready sale, opium has been and still is adulterated in every conceivable manner, and it is very difficult, if not impossible, to point out any physical characteristics of purity. The most satisfactory method is therefore to determine the medicinal strength of opium by the quantity of crude morphia it will yield, when a given weight is exhausted by cold water, this solution evaporated to the consistence of an extract, this dissolved again in cold water and the solution precipitated by ammonia; which precipitate dried, powdered and exhausted by spirit, will, by distillation and evaporation, yield morphia, which varies in amount according to the source and quality of the opium. When of average quality, this drug should yield at least four per cent., and when the opium is of the finest description, it will produce ten per cent. and upwards of morphia. Morphia itself is but seldom adulterated, but both the acetate and hydrochlorate are frequently so; the quantity of morphia these salts will yield when dissolved in as little water as possible, precipitated by just enough ammonia to effect the precipitation, and the resulting morphia dried and weighed, is the most satisfactory test; these salts should yield about 88 and 80 per cent. respectively of arenaceous morphia. See also MATERIA MEDICA: *Morphiæ Acetas*, *Morphiæ Hydrochloras.*

Incompatible with solutions of opium and the salts of morphia, are ammonia, potash, soda, and their carbonates, lime-water, most earthy and metallic salts, tincture of galls, and preparations containing tannic acid.

Pharmacopœia Preparations.—Of the salts of Morphia, Liquor Morphiæ Acetatis, Liquor Morphiæ Hydrochloratis. Of Opium, Confectio Opii, Extractum Opii, Pilula Saponis Composita, Pilula Styracis Composita, Pulvis Cretæ Compositus cum Opio, Pulvis Ipecacuanhæ Compositus, Pulvis Kino Compositus, Tinctura Camphoræ Composita, Tinctura Opii, Unguentum Gallæ Compositum, Unguentum Opii.

EXTRACTUM PAPAVERIS.

Extract of Poppy.

Extractum Papaveris Albi, P.L. 1788, edit. alt.
Extractum Papaveris, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Poppy [Capsules], bruised, the seeds being removed, fifteen ounces,
Distilled Water, boiling, a gallon;

Macerate for twenty-four hours; then boil down to four pints, and strain the liquor while hot; lastly, evaporate to a proper consistence.

Remarks.—Poppy-heads contain minute and variable proportions of opium.

Medicinal Uses.—Anodyne. Narcotic. Dose, from gr. ij. to gr. xx. given in the form of pills. This extract is said to be less apt than opium to occasion nausea, headache, and delirium, and is therefore to be preferred for procuring sleep in diseases in which the head is much affected.

EXTRACTUM PAREIRÆ.

Extract of Pareira.

Extractum Pareiræ, P.L. 1836.

Make this by the same method by which we have directed the Extract of Logwood to be prepared.

Medicinal Uses.—Diuretic. Dose, gr. x. to gr. xxx. with demulcents, occasionally combined with opium, hyoscyamus, &c., in *catarrhus vesicæ*, and irritations of the bladder. See Decoctum Pareiræ.

EXTRACTUM RHEI.

Extract of Rhubarb.

Extractum Rhei, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Powdered Rhubarb fifteen ounces,
Proof Spirit a pint,
Distilled Water seven pints;

Macerate for four days; then strain and set aside that the dregs may subside. Pour off the solution, and evaporate when clear to a proper consistence.

Remarks.—RHUBARB is the root of a plant belonging to the natural family *Polygonaceæ*, four descriptions of which are met with in commerce, the Russian, Chinese, East Indian, and English or European. This root has been subjected to frequent and elaborate research by various chemists, who under the names of Rhein, Rheinicin, Rhabarberin, Rhabarberic Acid, Chrysophanic Acid, Erythrose, Caphopicrite, Rhaponticin (?), Bitter principle, &c., have described a substance peculiar to Rhubarb; and who have also shown that this root probably contains some resins, gallic and tannic acids, sugar, starch, pectic acid, gummy, mucilaginous and extractive matters, salts of lime, especially the oxalate which exists in the root in well-defined crystals, besides various other organic substances and saline compounds incidental to many vegetable products.

Rhein or *Chrysophanic Acid* may be obtained from Rhubarb by means of ether, or as lately announced, by acting on powdered rhubarb by four times its weight of nitric acid, and dissolving the residue in alcohol or ether, which process is said to furnish this substance; the characters usually assigned to it differ widely in some respects, agreeing however in the splendour and intensity of the red colour it affords when acted upon by the alkalis, so that at present it is very doubtful whether the substance described under the various names above given is not composed in every case of two or even several distinct proximate principles; at any rate our present knowledge on this subject is too uncertain to render any further details respecting this presumed principle advisable in the present work, although it is both interesting and important.

Adulterations and Tests.—Rhubarb is more frequently adulterated with inferior, decayed, or worthless descriptions of the root than with any more direct sophisticant; this fraud is readily detected by a practised eye. When powdered gamboge or turmeric have been used as adulterants of powdered Rhubarb, if the former be present, digestion in ether and the addition of a few drops of the ethereal solution to water will produce an opaque bright yellow film of this gum-resin; if the latter, a solution of boracic acid will turn a decoction of it of a reddish brown colour, but will not affect it if turmeric be absent.

Pharmacopœia Preparations.—Extractum Rhei, Infusum Rhei, Pilula Rhei Composita, Tinctura Rhei Composita.

Medicinal Use.—This Extract is purgative. Dose, gr. x. to gr. xxx. in pills, or dissolved in some aromatic water. The virtues of Rhubarb are said to be much diminished by extraction.

EXTRACTUM SARSÆ LIQUIDUM.

Liquid Extract of Sarsaparilla.

Extractum Sarsaparillæ, P.L. 1809, P.L. 1824.
Extractum Sarzæ, P.L. 1836.

Take of Sarsaparilla three pounds and a half,
Distilled Water five gallons,
Rectified Spirit two fluidounces;

Boil down the Sarsaparilla in three gallons of the water to twelve pints, pour off the solution and strain whilst hot. Again boil down the Sarsaparilla in the remainder of the water to one-half and strain. Evaporate the mixed solutions to eighteen fluidounces, and when the extract has cooled, mix in the Spirit.

Remarks and Medicinal Uses.—See DECOCTUM SARSÆ. Dose, f℥j. to f℥iij.

EXTRACTUM STRAMONII.

Extract of Stramonium [*Thorn-apple*].

Extractum Stramonii, P.L. 1824, P.L. 1836.

Take of Stramonium Seeds fifteen ounces,
Distilled Water, boiling, a gallon;

Macerate for four hours, in a vessel lightly covered, near the fire; afterwards take out the Seeds, and bruise them in a stone mortar: return them when bruised to the liquor. Then boil down to four pints, and strain the liquor while hot. Lastly, evaporate to a proper consistence.

Remarks.—Stramonium, or Thorn-apple, is a herb belonging to the natural family *Solanaceæ*, the seeds of which contain a fixed oil, resin, &c., and *malate of daturia.* This alkaloid also exists in the leaves of this plant.

Daturia was discovered by Geiger and Hesse, and may be prepared from the seeds by the process directed for Aconitina, see Extractum Aconiti; it occurs in inodorous brilliant prisms, which at first have a bitterish and then a tobacco-like flavour; these are unalterable in the air, more soluble in alcohol than in ether, but scarcely at all so in water according to Dr. v. Planta. Its discoverers however remark that it dissolves in 280 parts of cold, and 72 parts of boiling water. Daturia melts at 190°, possesses strong alkaline powers, forms salts with acids, which yield precipitates with several metallic salts, tannic acid, and tincture of iodine. Dr. von Planta, who has analysed this alkaloid, regards it as isomeric with Atropia: see Atropiæ Sulphas.

Medicinal Uses.—Narcotic. Dose, gr. ss. to gr. ij. in asthmatic and maniacal affections. The leaves have been administered in lieu of tobacco made into cigars, or smoked from a pipe.

EXTRACTUM TARAXACI.

Extract of Taraxacum [*Dandelion*].

Extractum Taraxaci, P.L. 1809, P.L. 1824, P.L. 1836.

Prepare this in the same manner in which we have directed the Extract of Liquorice to be made.

Remarks.—See Decoctum Taraxaci.

Medicinal Uses.—Aperient, and deobstruent. Dose, gr.x. to ʒj.

EXTRACTUM UVÆ URSI.

Extract of Uvæ Ursi [*Whortleberry*].

Extractum Uvæ Ursi, P.L. 1836.

Prepare this in the same manner in which we have directed the EXTRACT OF HOP to be made.

Remarks and Medicinal Use.—See DECOCTUM UVÆ URSI. Dose, gr. v. to gr. xx.

INFUSA.

INFUSIONS.

Infusions are mere solutions of vegetable matter in water, which is sometimes used cold, but in the London Pharmacopœia it is in every instance directed to be boiling; in this state it is poured upon the substance, the active principles of which are intended to be dissolved. The aromatic, bitter, astringent, and mucilaginous properties of vegetable products are, to a considerable extent, soluble in water, while the saline ingredients are but imperfectly, and the resinous portions are totally unacted upon by it.

The substances infused should be only coarsely powdered, or cut into thin slices; for if they are employed in the state of fine powder, not only is the proper action prevented by the proximity of their particles, but the infusion is with difficulty rendered clear.

Hard water should, as much as possible, be avoided, for it not only acts less powerfully as a solvent, but the precipitation which takes place by boiling renders it turbid, and increases the difficulty of procuring a clear infusion. The infusions prepared with cold water are weaker than those in which hot water is employed, unless the digestion be continued for a much longer time.

Vegetables are stated to yield their virtues by infusion more readily when dried than when they are fresh.

If infusions be long kept, and especially in hot weather, they become turbid, deposit the matter which they had dissolved, and undergo decomposition; they ought, therefore, never to be kept for use longer than a few hours, but prepared for the occasion upon which they are prescribed.

INFUSUM ANTHEMIDIS.

Infusion of Chamomile.

Infusum Anthemidis, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Chamomile five drachms,
Distilled Water, boiling, a pint;
Macerate for ten minutes, in a vessel lightly covered, and strain.

Remarks.—The Chamomile is the dried flower of an indigenous plant belonging to the natural family *Compositæ*; it is extensively cultivated for medicinal purposes in this country, for which the single flowers are to be preferred. They contain a bitter astringent extractive and *Essential Oil of Chamomile*, which has a peculiar blue colour when first distilled, both tasting and smelling like the flowers: like many other essential oils, it is a mixture of an oxygenated oil, and a hydro-carbon; it has a specific gravity of 0·908, begins to boil at 338°, remains for a time stationary at 356°, and gradually attains 410°. The oxygenated oil affords valerianic and angelicic acids by the action of an alcoholic solution of potash. The hydro-carbon boils at 347°.

Incompatibles.—Solutions of the salts of iron, mercury, silver and lead.

Medicinal Use.—Stomachic, in dyspepsia; the infusion prepared with cold water, is said to be more grateful than that made with hot. Dose, f℥i. to f℥ij.

It is employed warm for promoting the operation of emetics.

INFUSUM ARMORACIÆ COMPOSITUM.

Compound Infusion of Horseradish.

Infusum Armoraciæ Compositum, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Sliced Horseradish,
Bruised Mustard, each an ounce,
Compound Spirit of Horseradish a fluidounce,
Distilled Water, boiling, a pint;

Macerate the Horseradish and Mustard in the Water for two hours in a lightly covered vessel, and strain; then add the Spirit.

Remarks.—HORSERADISH is the root of an indigenous plant belonging to the natural family *Cruciferæ*, so well known as to require no description. Its virtues depend upon a very pungent volatile oil, which is identical with that obtained from black mustard. See *Cataplasma Sinapis.*

Incompatibles.—Solutions of the salts of silver and mercury, and of the alkaline carbonates.

Medicinal Uses.—Stimulant in paralysis. Dose, f℥j. to f℥jss.

INFUSUM AURANTII COMPOSITUM.

Compound Infusion of Orange [Peel].

Infusum Aurantii Compositum, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Dried Orange Peel half an ounce,
Lemon Peel two drachms,
Bruised Cloves a drachm,
Distilled Water, boiling, a pint;

Macerate in a lightly covered vessel for a quarter of an hour, and strain.

Remarks.—ORANGE-PEEL is the rind of the fruit of a tree belonging to the natural family *Aurantiaceæ*, of which many varieties are cultivated, and the fruit imported to this country; the rind of the *Seville orange* is more bitter and contains more essential oil than that of the sweet orange, consequently the former is the variety intended by the College for use in this infusion. Its medicinal virtues chiefly depend upon the *Essential Oil of Orange-peel*, which, as might be imagined, is isomeric with the Essential Oil of Lemon, and of Turpentine, its formula being $C^{10}H^{8}$; its specific gravity is 0·835, and it boils at about 355°. The seeds of both oranges and lemons yield a neutral crystalline substance which has been termed *Limon.*

Adulterations and Tests.—The peel of the sweet orange is often substituted for, or mixed with, that of the Seville orange. Dr. Neligan points out that the convexity of the oil-vesicles of the former, and their concavity in the latter kind of orange, affords a distinguishing characteristic: this is readily available for fresh, but would fail with dried peel.

Pharmacopœia Preparations.—Confectio Aurantii, Infusum Aurantii Compositum, Infusum Gentianæ Compositum, Spiritus Armoraciæ Compositus, Syrupus Aurantii, Tinctura Aurantii, Tinctura Cinchonæ Composita, Tinctura Gentianæ Composita.

Lemon-peel is obtained from the well-known fruit the Lemon, which is also the product of a tree belonging to the natural family *Aurantiaceæ.* This fruit contains citric acid, see Liquor Ammoniæ Citratis, much employed in medicine, but the virtues of the rind or peel consists in

Essential Oil of Lemons, which is obtained from it both by expression and distilling it with water; it is of a pale yellow-green tint, its specific gravity is about 0·847, is very soluble in ether and absolute alcohol; rectified spirit dissolves about 14 per cent. of it. It does not congeal at temperatures much below the melting-point of ice, and possesses the same composition as oil of turpentine, see Emplastrum Galbani, being isomeric with this numerous group of essential oils. Its formula is $C^{10} H^{8}$. By exposure to air it absorbs oxygen, and forms a camphor fusible at 115°.

Incompatibles with the Infusion.—The salts of iron.

Pharmacopœia Preparations.—Infusum Aurantii Compositum, Infusum Gentianæ Compositum, Spiritus Ammoniæ Aromaticus, Tinctura Limonum.

Medicinal Uses.—The peels of both these fruits, and also of the Compound Infusion of Orange-peel, is Stomachic and Tonic. Dose of the Infusion, f℥j. to f℥ij.

INFUSUM BUCHU.

Infusion of Buchu.

Infusum Diosmæ, P.L. 1836.

Take of Buchu an ounce,
Distilled Water, boiling, a pint;
Macerate in a lightly covered vessel for four hours, and strain.

Remarks.—Buchu, the Diosma of the last Pharmacopœia, is the leaf of a small shrub belonging to the natural family *Rutaceæ.* That met with in the shops consists, according to Dr. Pereira, and Dr. Royle, of the leaves of several species of *Barosma*. Buchu has an aromatic, bitter and warm taste, chiefly owing to the essential oil which the leaves contain in numerous minute vesicles with which they are studded.

Composition.—According to the analysis of Brandes, Buchu yielded 3·78 per cent. of extractive, to which the name of *Diosmin* has been given; it is of a brownish-yellow colour, bitter, somewhat pungent, soluble in water, but not in alcohol nor in ether. The volatile oil, amounting to 0·88 per cent., is of a pale yellow colour, a penetrating taste, and is lighter than water.

Incompatibles.—The salts of iron and astringent preparations.

Pharmacopœia Preparation.—Infusum Buchu.

Medicinal Use.—Stimulant and tonic in chronic affections of the urinary organs attended with increased secretion of mucus. Dose, gr. xx. to gr. xxx. of the powder; f℥ss. to f℥ij. of the Infusion.

INFUSUM CALUMBÆ.

Infusion of Calumba.

Infusum Calumbæ, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Calumba, sliced, five drachms,
Distilled Water, boiling, a pint;
Macerate for two hours, in a vessel lightly covered, and strain.

Remarks.—CALUMBA is the dried root of a plant belonging to the natural family *Menispermaceæ*, growing near the coast of Mozambique and Oibo in East Africa. It is imported in flat cylindrical pieces of a faint aromatic smell, and pure bitter taste.

Composition.—According to Planche this root yields in 100 parts, bitter matter (*Calumbin*) 13, nitrogenous matter 6, starch 33, gum 9, woody fibre 39, with a trace of essential oil.

Calumbin crystallizes in rhombic prisms, it is neutral, extremely bitter, very slightly soluble in water, alcohol, ether or volatile oils, but boiling rectified spirit dissolves about 1-40th of its weight; acetic acid appears to be its best solvent, and it is dissolved by acids and alkalis generally. It consists of

Twelve equivalents	of Carbon....	$6 \times 12 = 72$	or	64·86
Seven ,,	of Hydrogen..	$1 \times 7 = 7$	,,	6·31
Four ,,	of Oxygen....	$8 \times 4 = 32$	,,	28·83
	Equivalent......	111.		100·

Formula...... $C^{12} H^7 O^4$.

Adulterations and Tests.—*False Calumba* has been occasionally substituted for calumba root; it may be distinguished from the true, which contains no tannic acid, by its infusion giving a bluish black precipitate with sulphate of iron, and precipitating a solution of gelatine.

Incompatibles.—The salts of lead, bichloride of mercury and lime-water.

Pharmacopœia Preparations.—Infusum Calumbæ, Tinctura Calumbæ.

Medicinal Uses.—Stomachic and tonic. Dose of the powder, gr. x. to gr. xxx. twice or thrice a day. Of the infusion, f℥j. to f℥ij.

INFUSUM CARYOPHYLLI.

Infusion of the Clove.

Infusum Caryophylli, P.L. 1809.
Infusum Caryophyllorum, P.L. 1809, edit. alt., P.L. 1824.
Infusum Caryophylli, P.L. 1836.

Take of the Clove, bruised, three drachms,
Distilled Water, boiling, a pint;
Macerate for two hours, in a vessel lightly covered, and strain.

Incompatibles.—Lime-water, solutions of the salts of iron, zinc, lead, silver, and antimony, and solution of gelatin.

Medicinal Uses.—Stimulant and stomachic. Dose, f℥i. to f℥ij. It is generally exhibited in combination with other medicines.

Remarks.—CLOVES are the dried unexpanded flower-buds of a tree growing originally in the Moluccas, and belonging to the natural family *Myrtaceæ*; those which are imported from Amboyna and Bencoolen, especially the latter, are preferred. Cloves possess a pleasant penetrating smell and pungent aromatic taste, principally owing to the essential oil they contain. Water, alcohol and ether more or less perfectly extract the medicinal properties of cloves; the aqueous infusion is reddened by nitric acid, and rendered blue by the sesquisalts of iron, owing to the tannic acid it contains.

Oleum Caryophylli, Essential Oil of Cloves, is obtained by distilling cloves with water; when recently distilled it is colourless or light yellow, becoming brownish by keeping. It has the odour of the cloves, an aromatic acrid taste, and is soluble in alcohol, ether, and acetic acid. It is the least volatile and almost the heaviest of all the essential oils. Its specific gravity varies from 1·055 to 1·060; it is neutral, and does not alter litmus or turmeric paper, and like most essential oils is a compound of a heavier and a lighter oil, which may be separated by the action of potash; the latter is a hydrocarbon belonging to the same series as oil of turpentine, lemon, &c., its formula being $C^{10} H^{8}$. It boils at 287°; its specific gravity is 0·918. The heavy oil combines with the potash and forms Eugenate of potash, from which it is again separated on the addition of a mineral acid, as *Eugenic Acid*. This is a colourless oily liquid possessing both the smell and taste of cloves, its specific gravity is 1·079, it boils at 470°, is readily soluble in water, ether and acetic acid, reddens litmus paper, and forms crystallized salts with several bases. Nitric acid turns it blood-red; it may also be obtained from oil of pimenta, see AQUA PIMENTÆ, and also, it is said, from Canella. It consists of

Twenty-four equivalents of Carbon ..	$6 \times 24 = 144$	or 72·36
Fifteen ,, of Hydrogen	$1 \times 15 = 15$	,, 7·54
Five ,, of Oxygen..	$8 \times 5 = 40$	,, 20·10
Equivalent....	199.	100·

Formula...... $C^{24} H^{15} O^{5}$.

By keeping common oil of cloves, or the saturated distilled water, by distilling the oil with water, or by treating cloves with alcohol, or ether, *Caryophyllin* is obtained in nacreous scales, or tufts of acicular crystals, which are inodorous and tasteless. This appears to be the camphor of cloves; it sublimes without change, is reddened by sulphuric and nitric acids, and its constitution is represented by the formula $C^{10} H^{8} O$.

Adulterations and Tests.—Cloves are sometimes mixed with those from which the oil has been distilled, but these are readily detected, being very light both in weight and colour, and exuding no oil when pressed by the nail. For Adulterants of Oil of Cloves, see Note at the end of Section AQUÆ.

Pharmacopœia Preparations.—Confectio Aromatica, Confectio Scammonii, Infusum Aurantii Compositum, Infusum Caryophylli, Spiritus Ammoniæ Aromaticus, Vinum Opii.

INFUSUM CASCARILLÆ.

Infusion of Cascarilla.

Infusum Cascarillæ, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Cascarilla, bruised, an ounce and a half,
Distilled Water, boiling, a pint;
Macerate for two hours in a lightly covered vessel, and strain.

Remarks.—CASCARILLA is the bark of a tree which grows in the Bahamas, and belongs to the natural family *Euphorbiaceæ*; it is rather hard, moderately heavy, and has a short resinous fracture; its odour is pleasant, and its taste warm, aromatic and bitter; water and spirit readily extract its active principles; it contains a peculiar neutral principle called *cascarillin*, which has the following properties: it crystallizes in colourless needles or hexagonal scales; it is inodorous and leaves a bitter after-taste. It is very slightly soluble in water, giving a perfectly neutral solution, which is intensely bitter, and does not precipitate any metallic salt. It is soluble in alcohol and in ether, dissolves in and gives a red colour to sulphuric acid; a small quantity of water precipitates part of it, the liquor becoming green; when more water is added the whole is precipitated of a green colour, and the liquor becomes colourless. Ammonia renders cascarillin yellow without dissolving it; hydrochloric acid dissolves it and assumes a violet colour, a little water renders it blue, and more green; with nitric acid a yellow solution is formed, from which ammonia throws down a precipitate insoluble in excess. It burns without leaving any residue. It does not appear to have been analysed. This bark also yields an *Essential Oil of Cascarilla*, which is greenish yellow, or blue; it has the odour and taste of the bark. Its specific gravity is 0·938.

Adulteration.—Copalchi bark is sometimes substituted for Cascarilla, which it much resembles in its general characters.

Incompatibles.—The same as those enumerated under Infusum Caryophylli.

Pharmacopœia Preparations.—Infusum Cascarillæ, Tinctura Cascarillæ.

Medicinal Use.—In cases requiring an aromatic stimulant, cascarilla may be given in powder, in doses from x to xxx grains. It is, however, more commonly exhibited in the form of infusion, of which the dose is f℥j. to f℥ij.

INFUSUM CATECHU COMPOSITUM.

Compound Infusion of Catechu.

Infusum Catechu, P.L. 1809.
Infusum Catechu Compositum, P.L. 1809, edit. alt., P.L. 1824, P.L. 1836.

Take of Catechu, bruised, six drachms,
Cinnamon, bruised, a drachm,
Boiling distilled Water a pint;
Macerate for an hour in a lightly covered vessel, and strain.

Remarks.—The Catechu of the Pharmacopœia is derived from the wood of a tree belonging to the natural family *Leguminosæ*, and from the leaves of a tree belonging to the natural family *Cinchonaceæ*; this latter is known in commerce as Terra Japonica. The different kinds of catechu vary both in value and in medicinal virtue, according to the quantity of a modification of tannic acid, the *Catechu-tannic acid*, which they contain, together with a peculiar acid termed *Catechuic Acid.*

Catechu-tannic Acid is not crystallizable, but by evaporating the solution *in vacuo* a transparent mass is obtained, which is of a slight yellow colour, astringent, soluble in water, alcohol, and ether. Among its peculiar characters are those of giving a dirty green precipitate with the perchloride of iron, and none with potassio-tartrate of antimony; it resembles, however, the gall-nut tannic acid in most of its properties, but is stated to differ from it in composition in containing four eqs. less of oxygen; the formula of catechu-tannic acid being, according to Pelouze, $C^{18} H^{8} O^{8}, HO$, but the accuracy of this formula is doubted by Sir Robert Kane.

Catechuic Acid is a fine white powder, composed of small silky crystals which have a sweetish taste. It is very sparingly soluble in cold water, but readily in boiling water; it is soluble in 10 parts of cold alcohol, and in 2 or 3 parts when boiling; 120 parts of cold, and 7 or 8 parts of boiling ether, dissolve one part of this acid. The aqueous solution does not redden litmus paper, nor precipitate gelatin; it gives an intense green colour to the salts of peroxide of iron, and precipitates acetate of lead and bichloride of mercury.

Various compositions have been assigned to this acid, but its formula can scarcely be yet regarded as determined. For further information on this subject I must refer to Kane's Elements of Chemistry, and other chemical authorities.

Adulterations and Tests.—Catechu is sometimes adulterated with earthy matter, which will be left by incineration. Starch has also been mixed with it, which will be detected by the blue colour produced on the addition of tincture of iodine to an infusion prepared with water at about 180°. When good it is nearly all dissolved by cold water. See Materia Medica: *Catechu.*

Incompatibles.—The alkalis, and alkaline earths; salts of iron, and most metallic salts; solution of gelatin, and vegetable decoctions or infusions containing an alkaloid, as Decoctum Cinchonæ.

Pharmacopœia Preparations.—Infusum Catechu Compositum, Tinctura Catechu Composita.

Medicinal Use of the Infusion. Astringent in diarrhœa. Dose, f℥j. to f℥iij. every four hours.

INFUSUM CINCHONÆ.

Infusion of Cinchona.

Take of Yellow Cinchona, bruised, an ounce,
Distilled Water, boiling, a pint;
Macerate for two hours in a lightly covered vessel, and strain.

Incompatibles.—See Decoctum Cinchonæ Rubræ.

Medicinal Uses.—Tonic in dyspepsia, &c. Dose, f℥j. to f℥iij. three or four times a day.

INFUSUM CINCHONÆ SPISSATUM.

Concentrated Infusion of Cinchona.

Take of Yellow Cinchona, coarsely bruised, three pounds,
Distilled Water six pints,
Rectified Spirit, as much as may be sufficient;

Macerate the Cinchona in the same manner in which the Extract of Cinchona is directed to be made, and strain. Evaporate the mixed infusions to one fourth part, and set aside that the dregs may subside. Pour off the clear liquor and strain the remainder. Then mix, and again evaporate until the specific gravity of the solution is 1·200. To this, when cold, pour in the spirit very gently, so that to each fluidounce of solution three fluidrachms may be added. Finally, set the solution aside for twenty days, that the dregs may be completely separated.

Remarks.—Neither of these preparations of Yellow Bark were in the last Pharmacopœia; this remark will also apply to Concentrated Infusion of Pale Bark. The use of these concentrated infusions is to save trouble in preparing the common infusion every time it may be required. In this concentrated form the infusion is generally reckoned to be from twenty-four to thirty-six times as strong as the ordinary infusions, but these proportions necessarily vary.

INFUSUM CINCHONÆ PALLIDÆ.

Infusion of Pale Cinchona.

Infusum Cinchonæ, P.L. 1809, P.L. 1824, P.L. 1836.

Prepare this in the same manner in which we have directed the Infusion of Cinchona to be made.

Medicinal Use.—See Infusum Cinchonæ.

INFUSUM CINCHONÆ PALLIDÆ SPISSATUM.

Concentrated Infusion of Pale Cinchona.

Prepare this in the same manner in which we have directed the Concentrated Infusion of Cinchona to be made.

INFUSUM CUSPARIÆ.

Infusion of Cusparia, or Angustura Bark.

Infusum Cuspariæ, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Cusparia, bruised, five drachms,
Distilled Water, boiling, a pint;
Macerate for two hours in a lightly covered vessel, and strain.

Remarks.—CUSPARIA, or ANGUSTURA BARK is obtained from a shrubby South American tree belonging to the natural family *Rutaceæ*; according to Fischer it contains an essential oil, two kinds of resin, angustura bitter, &c.; this bitter principle has been named *Cusparin* by Saladin. It is a neutral substance, and is said to crystallize in tetrahedrons; cold water dissolves 1-200dth, and boiling water 1-100dth, of its weight. It dissolves in concentrated acids and in the alkalis, and is precipitated by infusion of galls.

Adulterations and Tests.—This bark has occasionally been adulterated with false Angustura bark, a poisonous substance; this however seldom now occurs. Nitric acid is said to stain the false bark bright red when applied to a broken surface, but merely to deepen the colour of the genuine bark.

Incompatibles.—Most metallic salts and tincture of galls.

Medicinal Use.—Tonic and stimulant in dyspepsia. Dose, f℥j. to f℥ij.

INFUSUM DIGITALIS.

Infusion of Digitalis [*Foxglove*].

Infusum Digitalis, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Digitalis, dried, a drachm,
Spirit of Cinnamon a fluidounce,
Distilled Water, boiling, a pint;
Macerate the Digitalis in the Water for four hours, in a lightly covered vessel, and strain; then add the Spirit.

Remarks.—The FOXGLOVE is a well-known indigenous plant belonging to the natural family *Scrophulariaceæ*, the leaves of which have a nauseous acrid taste, and contain, besides tannic acid and some volatile constituents, salicin ?, *digitalin*, and *digitalic acid*. The mode of preparing digitalin is a complicated one, and as this principle is not inserted in Materia Medica nor often employed in medicine, I refer to the Chemical Gazette, vol. iii. pp. 77–82, for this process.

Digitalin is white, scentless, but extremely bitter to the taste, so much so that water containing a 200,000th part is distinctly bitter. Its powder produces violent sneezing. It is neutral, very slightly soluble in water or in ether, but readily dissolves in alcohol. Concentrated hydrochloric acid produces an emerald-green colour with this substance, which produces in the most minute doses, rapid diminution of the pulse.

Digitalic acid is obtained in acicular crystals, which possess a peculiar odour; it is soluble in water, reddens litmus paper, forms salts with bases, rapidly decomposes by exposure to the air, and yields white precipitates with salts of protoxide of iron, lead, and silver. Neither of these substances appear to have been analysed.

Incompatibles.—Ferruginous salts, and probably the salts of most other metals. The decoctions and infusions of Cinchona.

Pharmacopœia Preparations.—Infusum Digitalis, Tinctura Digitalis.

Medicinal Uses.—Diuretic. Dose, f ʒij. to f℥j. twice a day.

INFUSUM GENTIANÆ COMPOSITUM.

Compound Infusion of Gentian.

Infusum Amarum Simplex, P.L. 1721, P.L. 1746.
Infusum Gentianæ Compositum, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Gentian, sliced,
Orange-peel, dried, each two drachms,
Lemon-peel four drachms,
Distilled Water, boiling, a pint;

Macerate for an hour in a lightly covered vessel, and strain.

Remarks.—See EXTRACTUM GENTIANÆ.

Incompatibles.—Diacetate of lead, sulphate of iron, and analogous salts.

Pharmacopœia Preparation.—Mistura Gentianæ Composita.

Medicinal Use.—Stomachic and tonic. Dose, f℥jss. to f℥ij.

INFUSUM KRAMERIÆ.

Infusion of Rhatany.

Take of Rhatany an ounce,
Distilled Water, boiling, a pint;

Macerate for four hours, in a vessel lightly covered, and strain.

Remarks.—RHATANY is the root of a Peruvian plant belonging to the natural family *Polygalaceæ*. It contains a large quantity of tannic acid.

Incompatibles.—Salts of iron, lime-water, and all substances acted on by vegetable astringents.

Medicinal Uses.—Tonic and astringent. Dose, f℥jss. to f℥ij.

INFUSUM LINI COMPOSITUM.

Compound Infusion of Linseed.

Infusum Lini, P.L. 1809.
Infusum Lini Compositum, P.L. 1824, P.L. 1836.

Take of Linseed six drachms,
Fresh Liquorice, sliced, two drachms,
Distilled Water, boiling, a pint;

Macerate for four hours, near the fire, in a vessel lightly covered, and strain.

Remarks.—See CATAPLASMA LINI.

Incompatibles.—Preparations of lead and iron, and probably most metallic salts.

Medicinal Uses.—Demulcent in dysuria and catarrh.

INFUSUM LUPULI.

Infusion of the Hop.

Infusum Lupuli, P.L. 1836.

Take of the Hop six drachms,
Distilled Water, boiling, a pint;

Macerate for four hours, in a vessel lightly covered, and strain.

Remarks.—See EXTRACTUM LUPULI.

Medicinal Uses.—Tonic, stomachic and slightly narcotic. Dose, f℥j. to f℥iss.

INFUSUM QUASSIÆ.

Infusion of Quassia.

Infusum Quassiæ, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Quassia, sliced, two scruples,
Distilled Water, boiling, a pint;

Macerate for two hours, in a vessel lightly covered, and strain.

Remarks.—QUASSIA is the wood of a West Indian tree belonging to the natural family *Simarubaceæ*. The medicinal power of quassia appears to exist in a peculiar neutral substance called *Quassin* or *Quassite*. It is colourless, crystallizes in very small prisms, is very slightly soluble in water, 100 parts taking up but 0·45 part of it; ether also dissolves it sparingly: its best solvent is hot and strong alcohol. The aqueous solution of quassia is precipitated white by tannic acid, but is not altered by chlorine or by iodine. It is said to contain *Esculin*.

Adulterations and Tests.—Other woods are sometimes substituted for Quassia; these are usually wanting in the peculiar pure bitter taste of this wood, and their infusions generally are changed to black or bluish-black by a sesquisalt of iron, which will not affect the infusion of genuine quassia.

Incompatibles.—Few substances produce any effect upon this solution.

Medicinal Uses.—Stomachic and tonic. Dose, f℥jss. to f℥ij.

INFUSUM RHEI.

Infusion of Rhubarb.

Infusum Rhei, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Rhubarb, sliced, three drachms,
Distilled Water, boiling, a pint;
Macerate for two hours, in a vessel lightly covered, and strain.

Remarks.—See Extractum Rhei.

Incompatibles.—The stronger acids, metallic solutions, some astringent infusions. The alkalis darken the colour of this infusion, but do not decompose it.

Medicinal Uses.—Stomachic and tonic. Dose, f℥j. to f℥iij.

INFUSUM ROSÆ COMPOSITUM.

Compound Infusion of the Rose.

Tinctura Rosarum Rubrarum, P.L. 1721.
Tinctura Rosarum, P.L. 1746.
Infusum Rosæ, P.L. 1788, P.L. 1809.
Infusum Rosæ Compositum, P.L. 1824, P.L. 1836.

Take of the Red Rose [Petals], dried, three drachms,
Diluted Sulphuric Acid a fluidrachm and a half,
Sugar six drachms,
Distilled Water, boiling, a pint;
Pour the Water upon the Rose [Petals], previously pulled asunder; then mix in the acid. Macerate for two hours, and strain the liquor; then add the Sugar.

Remarks.—The Red Rose is a well-known shrub belonging to the natural family *Rosaceæ.* The petals contain tannic and gallic acids and an essential oil. See Aqua Rosæ.

Pharmacopœia Preparations.—Confectio Rosæ, Infusum Rosæ Compositum, Mel Rosæ.

Incompatibles—Alkalis and earths, and all substances which combine with sulphuric acid, or are acted upon even by small quantities of it; acetate of lead of course throws down a copious precipitate. Sulphate of iron gives it a brown colour, but no precipitate is formed for some hours. It is much employed as a vehicle for the exhibition of cathartic salts.

Medicinal Uses.—Astringent and refrigerant. Dose, f℥j. to f℥jss. or more.

INFUSUM SENNÆ COMPOSITUM.

Compound Infusion of Senna.

Infusum Senæ, P.L. 1721.
Infusum Senæ Commune, P.L. 1746.
Infusum Sennæ Simplex, P.L. 1788.
Infusum Sennæ, P.L. 1809.
Infusum Sennæ Compositum, P.L. 1824, P.L. 1836.

Take of Senna fifteen drachms,
Ginger, bruised, four scruples,
Distilled Water, boiling, a pint;
Macerate for an hour, in a vessel lightly covered, and strain.

Remarks.—This infusion spoils quickly; when exposed to the air a yellow precipitate is formed in it, and its purgative qualities are lost.

Incompatibles.—Strong acids, lime-water, and most metallic salts.

Medicinal Use.—Purgative. Dose, f℥iij. to f℥iv.

Pharmacopœia Preparation.—Mistura Gentianæ Composita.

Remarks.—SENNA is the leaf of a plant belonging to the natural family *Leguminosæ*, imported from the Levant, and the East and West Indies. The varieties of Senna differ in their external characters, but there is little difference in the smell and taste of the different species. These leaves consist of *cathartin*, a peculiar principle, many other substances common to vegetables, and *chrysoretin*, a resinous substance of a bitter taste and powerful odour of senna; neither this substance nor cathartin (a singular name to select for a substance destitute of cathartic properties) has been analysed; they are both, particularly cathartin, in all probability, mixtures of two or more distinct principles. Senna yields its medicinal properties to either hot or cold water, and also to alcohol.

Adulterations and Tests.—The leaves of other plants resembling Senna are frequently used to adulterate it. For tests, see MATERIA MEDICA: *Senna Alexandrina* and *Senna Indica.*

Pharmacopœia Preparations.—Confectio Sennæ, Infusum Sennæ Compositum, Syrupus Sennæ, Tinctura Sennæ Composita. The two varieties selected by the College are used indifferently in these preparations.

INFUSUM SERPENTARIÆ.

Infusion of Serpentary.

Infusum Serpentariæ, P.L. 1836.

Take of Serpentary half an ounce,
Distilled Water, boiling, a pint;
Macerate for four hours, in a vessel lightly covered, and strain.

Remarks.—SERPENTARY, or Virginian Snake-root, is obtained from a shrub or herb belonging to the natural family *Aristolochiaceæ.* It contains an essential oil, resin, extractive, &c., and possesses a peculiar aromatic odour, and a warm taste.

Pharmacopœia Preparations.—Infusum Serpentariæ, Tinctura Cinchonæ Composita, Tinctura Serpentariæ.

Medicinal Uses.—Diaphoretic. Tonic. Dose, f℥j. to f℥ij. two or three times a day.

INFUSUM VALERIANÆ.

Infusion of Valerian.

Infusum Valerianæ, P.L. 1836.

Take of Valerian half an ounce,
Distilled Water, boiling, a pint;
Macerate for half an hour, in a vessel lightly covered, and strain.

Remarks.—VALERIAN is the root of an indigenous plant belonging to the natural family *Valerianaceæ.* The active constituents of this root appear to be an essential oil and *valerianic acid.* There is reason to believe that this acid does not actually exist in the fresh root as valerianic acid, but that it is a *product* of some transformation, or oxidation of its constituents, either when the root is dried, or else when it is submitted to distillation with water, as is the case with those essential oils of which Oil of Bitter Almonds may be regarded as the type. Late experiments lead to the opinion that this acid is produced from *Essential Oil of Valerian*, which is pale green, or yellowish, and may be obtained from the dried root by distillation with water in the usual manner; it consists, like many other essential oils, of a hydrocarbon, and an oxygenated oil, the former of which greatly resembles, both in properties and composition, oil of turpentine; whilst the latter, which is less volatile, crystallizes when exposed to cold, and possesses a faint smell like hay, not at all resembling valerian, and is converted by the oxygen of the air, or by the action of caustic potash, into

Valerianic Acid, which is so interesting both on pharmaceutical and chemical grounds, that I subjoin a process for obtaining it.

Process.—Boil 40lbs. of the crushed root of valerian with rather less than its own bulk of water, together with 2½lbs. of carbonate of soda previously rendered caustic, for three or four hours, adding fresh water as required. Expose this decoction and the roots to air for three or four weeks, stirring frequently; at the expiration of this time, add sufficient sulphuric acid to saturate the soda employed; this should be rather in excess; and distil the mixture, plentifully diluted with water, so long as the water which passes over is acid to test-paper; separate the essential oil which may come over, saturate the distilled water with carbonate of soda, and evaporate this solution to a syrup, gradually add sufficient sulphuric acid diluted with its own weight of water to barely saturate the soda employed, particular care being taken to avoid an excess of acid, and mix them well; at the expiration of twenty-four hours the valerianic acid will have separated and risen to the surface of the mixture, from which it may be drawn off by a siphon, or obtained by a separator, in which kind of vessel this last-described operation is best performed. This when rectified furnishes pure valerianic acid; the valerianic acid which remains dissolved in the mother-liquor may be obtained by distilling it after separating the crystals of sulphate of soda. Valerianic acid thus obtained is an oleaginous liquid of specific gravity 0·960; it boils at 266°, and congeals at zero; it smells most strongly of valerian, and has an acid, pungent and offensive taste, it is soluble in alcohol, ether, and in water, forms salts with bases, and combines with water in two proportions, of which this oleaginous liquid is the monohydrate, the other being a terhydrate. Anhydrous Valerianic Acid consists of

Ten equivalents	of Carbon	6×10=	60	or 64·5
Nine „	of Hydrogen ..	1× 9=	9	„ 9·7
Three „	of Oxygen	8× 3=	24	„ 25·8
		Equivalent.....	93.	100·

Formula...... $C^{10} H^{9} O^{3}$.

This acid may also be obtained by exposing *potato-oil*, called also *fusel-oil* and *amylic alcohol*, to the action of air, or by heating it with caustic potash and quicklime, when by the oxidation of two eqs. of hydrogen and the absorption of two additional eqs. of oxygen, a process resembling the formation of acetic acid from wine-alcohol

Potato oil................. $C^{10} H^{12} O^{2}$ becomes
Terhydrated Valerianic Acid $C^{10} H^{12} O^{6}$, or $C^{10} H^{9} O^{3}, 3HO$.

The hypothetical base of these and also of some other analogous compounds is termed *valyl*, its formula being $C^{8} H^{9}$.

Valerianic acid occurs in fish oils, decaying cheese, &c., and proves to be a very common product of the *eremacausis* or decay and oxidation of organic bodies.

Pharmacopœia Preparations.—Infusum Valerianæ, Tinctura Valerianæ, Tinctura Valerianæ Composita.

Medicinal Use of the Infusion, Antispasmodic. Dose, f℥j. to f℥ij. two or three times a day.

LINIMENTA.

LINIMENTS.

LINIMENTUM ÆRUGINIS.

Liniment of Verdigris.

Unguentum Ægyptiacum, P.L. 1721.
Mel Ægyptiacum, P.L. 1746.
Oxymel Æruginis, P.L. 1788.
Linimentum Æruginis, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Verdigris, powdered, an ounce,
Vinegar seven fluidounces,
Honey [despumated] fourteen ounces;

Dissolve the Verdigris in the Vinegar, and strain through a linen cloth; afterwards, the Honey being poured in, boil down to a proper consistence.

Medicinal Use.—Detergent and escharotic.

Remarks.—VERDIGRIS, "blue verdigris," is prepared in two modes, one of which consists in exposing plates of copper to the simultaneous action of air on the husks and stalks of grapes undergoing the acetous fermentation after wine-making; the metal becomes gradually corroded and covered with a bluish substance, which is scraped off the copper plates from time to time: by the other plan, plates of copper are subjected to the combined influence of air and the vapour of acetic acid.

Properties.—Verdigris is an impure diacetate of copper, which salt when pure occurs in minute silky crystals of a delicate blue colour, which are scarcely distinguishable in the compact masses of verdigris usually met with; these, like the crystals, are of a light blue colour, and their odour resembles, but is more disagreeable than, that of acetic acid; the taste of verdigris is very disagreeable, astringent and metallic; like other salts of copper it is poisonous; it undergoes little or no change by exposure to the air, and is insoluble in alcohol; water decomposes and converts it into the soluble neutral acetate, and the insoluble trisacetate. If heated to 212°, the crystals become greenish and lose water. When treated with sulphuric acid, acetic acid is expelled and sulphate of copper formed. Diacetate of copper consists of

Two equivalents of Oxide of Copper	$40 \times 2 = 80$	or	43·24
One ,, of Acetic Acid..........	51	,,	27·57
Six ,, of Water	$9 \times 6 = 54$	,,	29·19
Equivalent......	185.		100·

Formula...... $2\mathrm{CuO}, \mathrm{C}^4 \mathrm{H}^3 \mathrm{O}^3, 6\mathrm{HO}$.

Adulterations and Tests.—Verdigris is sometimes adulterated with a mixture of chalk and sulphate of copper, interspersed with a few grape-stones and stalks. Good verdigris should dissolve in hydrochloric acid without effervescence, the clear solution should give no precipitate with chloride of barium, nor when supersaturated with ammonia should a little carbonate of ammonia cause any precipitation. See MATERIA MEDICA : *Ærugo.*

LINIMENTUM AMMONIÆ.

Liniment of Ammonia.

Linimentum Ammoniæ Fortius, P.L. 1788, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Solution of Ammonia a fluidounce,
Olive Oil two fluidounces;
Shake them together until they are mixed.

LINIMENTUM AMMONIÆ SESQUICARBONATIS.

Liniment of Sesquicarbonate of Ammonia.

Linimentum Volatile, P.L. 1746.
Linimentum Ammoniæ, P.L. 1788.
Linimentum Ammoniæ Carbonatis, P.L. 1809.
Linimentum Ammoniæ Subcarbonatis, P.L. 1809, edit. alt., P.L. 1824.
Linimentum Ammoniæ Sesquicarbonatis, P.L. 1836.

Take of Solution of Sesquicarbonate of Ammonia a fluidounce,
Olive Oil three fluidounces;
Shake them together until they are mixed.

Remarks.—In the first of these preparations the union between the ammonia and oil is the more perfect; less so in the latter, because of the carbonic acid combined with the ammonia.

Medicinal Use.—They are employed as stimulants in cynanche tonsillaris, spread on flannel, and applied round the throat.

LINIMENTUM CALCIS.

Liniment of Lime.

Take of Solution of Lime,
Olive Oil, each ten fluidounces;
Shake them together until they are mixed.

Medicinal Uses.—This is one of the new preparations of the present Pharmacopœia; it has long been esteemed a useful application to scalds and burns.

LINIMENTUM CAMPHORÆ.

Liniment of Camphor.

Linimentum Camphoræ, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Camphor an ounce,
Olive Oil four fluidounces;
Dissolve.

Medicinal Use.—This is employed as a stimulant embrocation to sprains and bruises, and in rheumatism.

LINIMENTUM CAMPHORÆ COMPOSITUM.

Compound Liniment of Camphor.

Linimentum Camphoræ, P.L. 1788.
Linimentum Camphoræ Compositum, P.L. 1788, edit. alt., P.L. 1809, P.L. 1824, P.L. 1836.

Take of Camphor two ounces and a half,
Oil of Lavender a fluidrachm,
Rectified Spirit seventeen fluidounces,
Stronger Solution of Ammonia three fluidounces;

Dissolve the Oil and Camphor in the Spirit, then add the Ammonia, and shake together until they are mixed.

Medicinal Use.—This is used for the same purposes as the former, and is much more powerful on account of the ammonia which it contains.

LINIMENTUM HYDRARGYRI.

Liniment of Mercury.

Linimentum Hydrargyri, P.L. 1809, P.L. 1824.
Linimentum Hydrargyri Compositum, P.L. 1836.

Take of Ointment of Mercury,
Lard, each four ounces,
Camphor an ounce,
Rectified Spirit a fluidrachm,
Solution of Ammonia four fluidounces;

Rub the Camphor, first with the Spirit, then with the Lard and the Ointment; lastly, the Solution of Ammonia being gradually poured in, mix them all.

Medicinal Uses.—This liniment is stimulant and discutient. One drachm, containing nearly ten grains of mercury, may be rubbed on the affected part night and morning. It is said to salivate sooner than mercurial ointment, when freely employed.

LINIMENTUM OPII.

Liniment of Opium.

Linimentum Opii, P.L. 1836.

Take of Tincture of Opium two fluidounces,
Liniment of Soap six fluidounces;
Mix.

Medicinal Use.—This is a useful sedative liniment.

LINIMENTUM SAPONIS.

Liniment of Soap.

Linimentum Saponaceum, P.L. 1746.
Linimentum Saponis, P.L. 1788.
Linimentum Saponis Compositum, P.L. 1788, edit. alt., P.L. 1809, P.L. 1824.
Linimentum Saponis, P.L. 1836.

Take of Soap two ounces and a half,
Camphor ten drachms,
Spirit of Rosemary eighteen fluidounces,
Distilled Water two fluidounces;

Mix the Water with the Spirit, then add the Soap and Camphor, and macerate, shaking frequently until they are dissolved.

Pharmacopœia Preparation.—Linimentum Opii.

Medicinal Use.—This is a stimulant application; it is less powerful than the Linimentum Camphoræ Compositum, but is used for similar purposes.

LINIMENTUM TEREBINTHINÆ.

Liniment of Turpentine.

Linimentum Terebinthinæ, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Soft Soap two ounces,
Camphor an ounce,
Oil of Turpentine sixteen fluidounces;
Shake them together until they are mixed.

Medicinal Use.—This is a more powerful stimulant application than the preceding.

MELLITA.

PREPARATIONS OF HONEY.

Honey is the well-known saccharine substance secreted by most flowers, usually in a thinner and more colourless condition than it is met with in the *comb*, in which it is deposited by bees. Whether it undergoes any elaboration in the *honey-bag* of the bee collecting it, save perhaps a little loss of water, is doubtful; the difference between that directly exuded from the nectaries of some flowers, and that obtained by opening the honey-bag of the insect being imperceptible, excepting in consistence.

Composition.—According to an analysis of Proust's, honey consists of a crystallizable sugar (grape-sugar), uncrystallizable sugar, mannite, yellow colouring matter, wax, traces of free acid and animal matter. From the alteration, *candying*, honey undergoes by keeping, the so-called uncrystallizable sugar is probably a mere modification of grape-sugar which by time resumes its crystallizing property, as is frequently the case with syrups made with cane-sugar.

For medicinal purposes, honey should always be clarified or *despumated*, by melting it in a water-bath, skimming, and allowing any dregs to subside.

Adulterations and Tests.—Flour, starch, and starch-sugar are its most usual adulterants. Mere solution in cold water will detect the two first, in which menstruum they are insoluble. Several tests have been proposed to determine the presence of starch-sugar, but no great reliance can be placed upon any of them.

Pharmacopœia Preparations.—Confectio Rutæ, Confectio Piperis, Linimentum Æruginis, Mellita.

Medicinal Uses.—Demulcent and gently laxative, and as a convenient vehicle for other medicines.

MEL BORACIS.

Honey of Borax.

Mel Boracis, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Borax, powdered, a drachm,
Honey [despumated] an ounce.
Mix.

Remarks.—BORAX, in its native and impure crystalline state called *Tincal*, is imported from the East Indies and purified in this country; it is also artificially prepared by combining boracic acid, obtained from the lagoons of a volcanic district of Tuscany, with soda.

Properties.—This salt forms colourless transparent crystals of considerable size, the primary form of which is an oblique rhombic prism. It effloresces by exposure to the air; its taste is saline, cooling and alkaline. Borax is soluble in 20 parts of cold and 6 parts of boiling water, and the solution reacts like an alkali on turmeric paper. From a saturated boiling solution of this salt, sulphuric acid precipitates crystalline scales of boracic acid.

Composition.—Borax is a *Biborate of Soda*, consisting of

One equivalent of Soda		32	or 16·66
Two „ of Boracic Acid	35 × 2 =	70	„ 36·45
Ten „ of Water	9 × 10 =	90	„ 46·89
Equivalent		192.	100·

Formula...... $NaO, 2BO^3, 10HO$.

Boracic acid is an oxide of the elementary body *Boron*, discovered by Davy in 1807. Boron is of a dark greenish brown colour, destitute of smell and taste, infusible and fixed even at high temperatures. It combines with most elementary bodies, especially oxygen, in which it burns at about 600°, forming boracic acid, the alcoholic solution of which burns with a green flame. Boracic acid is a teroxide of boron, its Formula being BO^3 and its Equivalent 35.

Adulterations and Tests.—Borax is seldom adulterated, but if mixed with alum, this salt may be detected by adding ammonia to a solution of the suspected borax, when a bulky gelatinous precipitate of alumina will be precipitated, if alum be present. See MATERIA MEDICA: *Borax.*

Medicinal Uses.—Detergent and cooling in aphthous affections of the tongue and fauces. Borax forms an emulsion with water and oil of almonds, or olive oil.

MEL ROSÆ.

Honey of Rose.

Mel Rosatum, P.L. 1721.
Mel Rosaceum, P.L. 1746.
Mel Rosæ, P.L. 1788, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Red Rose [Petals], dried, four ounces,
Distilled Water, boiling, twenty-four ounces [*fluidounces*].
Honey [despumated] five pounds;

Macerate the Rose [Petals], previously pulled asunder, in sixteen fluidounces of the Water for two hours; then squeeze gently with the hand, and strain. Again macerate the residue in the remainder of the Water for a short time, and pour off the liquor. Add one-half of the first infusion to this, and set aside the other half. Then add the Honey to the mixed liquors, and evaporate in a water-bath, with the liquor set aside being mixed with it, until it becomes of a proper consistence.

Medicinal Use.—As an adjunct to detergent and astringent gargles.

OXYMEL.

Oxymel.

Oxymel Simplex, P.L. 1721, P.L. 1746, P.L. 1788.
Mel Acetatum, P.L. 1788, edit. alt.
Oxymel, P.L. 1809.
Oxymel Simplex, P.L. 1809, edit. alt., P.L. 1824.
Oxymel, P.L. 1836.

Take of Acetic Acid, seven fluidounces,
Distilled Water eight fluidounces,
Honey [despumated] five pounds;
Mix the Acid added to the Water with the Honey made hot.

Medicinal Use.—Detergent; principally used as the basis of gargles and expectorant remedies. Dose, fʒj. to f℥ss.

OXYMEL SCILLÆ.

Oxymel of Squill.

Oxymel Scilliticum, P.L. 1721, P.L. 1746.
Oxymel Scillæ, P.L. 1788, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Vinegar of Squill two pints and a half,
Honey [despumated] five pounds;
Evaporate the Vinegar with a slow fire to twelve fluidounces, and mix with the Honey made hot.

Medicinal Use.—Expectorant. Dose, fʒss. to fʒij. in chronic coughs. In large doses it is emetic.

METALLICA.

METALLIC PREPARATIONS.

PRÆPARATA EX ALUMINIO.

PREPARATIONS OF ALUMINIUM.

The metal *Aluminium* was isolated by Wöhler, by heating anhydrous chloride of aluminium with potassium. The metal thus obtained is a powder of a platinum-grey colour, and often occurs in small and perfectly malleable spangles, which under the burnisher acquire both the colour and lustre of tin. Its specific gravity is about 2·67. It is not oxidized by exposure to air, but when boiled with water slowly decomposes it, liberates hydrogen gas, and is oxidized, forming alumina. The concentrated acids exert no action upon it, but it is oxidized by solutions of the alkalis, and even by ammonia. Some difference of opinion has existed respecting the equivalent or atomic weight of this metal, arising from the various views which have been taken of the constitution of its only known oxide alumina, some regarding this as a protoxide, others as a sesquioxide of the metal; the latter, however, is now generally adopted, which will give 14 as the equivalent of aluminium; but as there is no combination in which its oxide does not exist as a double equivalent, it is convenient to regard alumina as composed of

Two equivalents of Aluminium	$14 \times 2 = 28$
Three „ of Oxygen	$8 \times 3 = 24$
Equivalent......	*52*

Formula...... $Al^2 O^3$.

Alumina is the chief constituent of every kind of clay, and also of the ruby and sapphire. When pure it is white, destitute of smell and taste; fusible at very high temperatures, and then is so hard as to cut glass like the diamond. It possesses both basic and acid properties, forming salts of alumina with the acids, and aluminates with several bases, as the aluminates of potash and zinc. It forms three hydrates with water, containing one, three, and eight eqs. of water combined with one eq. of alumina. Its characteristic tests are first, precipitation as a bulky gelatinous precipitate from solutions of its salts on the addition of solution of potash, which is re-dissolved when that alkali is added in excess, and its being stained of a beautiful blue colour when moistened with nitrate of cobalt and strongly heated. Its most important salt is the following double sulphate of alumina and potash.

ALUMEN EXSICCATUM.

Dried Alum.

Alumen Ustum, P.L. 1721, P.L. 1746, P.L. 1788.
Alumen Exsiccatum, P.L. 1809, P.L. 1824, P.L. 1836.

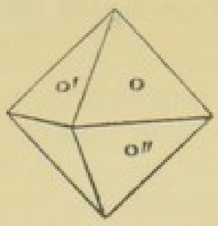
Take of Alum a pound;

Melt the Alum by fire; then let the fire be increased until the ebullition has ceased.

Remarks.—There exist several double sulphates included under the generic term *alum*; three of which contain alumina combined either with sulphate of potash, of soda, or of ammonia; the first of these, or common alum, the alum of the Pharmacopœia, is the best known, and most extensively employed; they all form octohedral crystals.

Alum is a colourless, transparent, and crystalline salt; the primary form of which is a cube, but it usually crystallizes in regular octahedrons, which are often very large:

$$\left.\begin{array}{c}\text{O on O}'\\ \text{or}\\ \text{O on O}''\end{array}\right\}109^\circ\ 28'\ 16''$$



Alum is styptic and astringent; dissolves in 18 times its weight of water at 60°, and in $\frac{3}{4}$ths of its weight at 212°. The solution reddens litmus paper; when moderately heated it first melts in its water of crystallization; as soon as this is expelled it becomes opaque and spongy, the Alumen Exsiccatum of the Pharmacopœia; and when more strongly heated, a portion of the sulphuric acid is driven off; if the heat be still more strongly urged, all the sulphuric acid of the salt is vaporized, the alumina combining with the potash, forming aluminate of potash.

Composition.—Alum consists of

One equivalent	of Alumina		52	or 10·92
One ,,	of Potash		48	,, 10·08
Four ,,	of Sulphuric acid	40× 4=	160	,, 33·68
Twenty-four ,,	of Water	9×24=	216	,, 45·32
	Equivalent		76.	100·

or it may be regarded as composed of

One equivalent	of Tersulphate of Alumina	120+52=172	or 260
One ,,	of Sulphate of Potash	40+48= 88	
Twenty-four ,,	of Water	9×24=216	,, 216
		476	476

Formula...... $Al_2 O^3, 3SO^3; KO, SO^3; 24 HO.$

Alum is extensively employed in the arts; for information respecting these uses, and also the modes of manufacturing alum, I must refer to chemical writers.

Adulterations, Impurities, and Tests.—Alum is not subject to adulteration; it is sometimes rendered impure by the presence of iron; when pure it is entirely soluble in water; potash gives a precipitate with it, which is perfectly soluble in excess of the alkali; tincture of galls does not blacken the solution.

Incompatibles.—Alkalis and their carbonates; lime and lime-water, magnesia and its carbonate, tartrate of potash, acetates of lead, &c.

Pharmacopœia Preparations.—Alumen Exsiccatum, Liquor Aluminis Compositus.

Medicinal Uses.—Alum is internally a powerful astringent in hæmorrhages and inordinate fluxes, and is externally useful in repellent astringent lotions and collyria. Dose, gr. x. to gr. xx.

LIQUOR ALUMINIS COMPOSITUS.

Compound Solution of Alum.

Aqua Aluminosa Bateana, P.L. 1746.
Aqua Aluminis Composita, P.L. 1788.
Liquor Aluminis Compositus, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Alum,
Sulphate of Zinc, each an ounce,
Distilled Water three pints;

Rub the Alum and Sulphate together, and dissolve in the water; afterwards strain.

Medicinal Uses.—This solution is powerfully astringent, and is successfully used as a detergent lotion to old ulcers, as a collyrium and as an injection; it will also often remove chilblains, and relieve slight excoriations.

PRÆPARATA EX ANTIMONIO.

PREPARATIONS OF ANTIMONY.

Remarks.—Antimony (Antimonium, Stibium), from the last of which its symbol Sb is derived, is a very widely disseminated metal; its principal, and indeed only source, however, being the native sulphuret, which when freed by fusion from the stony matter, gangue or matrix, with which it is mixed, is *crude antimony,* the Antimonii Tersulphuretum of the Pharmacopœia. From this, Antimony is obtained by various processes, but in this country it is usually procured by adding to the ore in a state of fusion, wrought iron turnings, clippings of tin-plate, &c., which combine with the sulphur of the ore, forming sulphuret of iron, and liberating the antimony, which, owing to its superior density, sinks to and collects at the bottom of the mould into which the molten materials are poured. This is the *regulus of antimony* of commerce.

Properties.—Antimony is a crystalline metal, its primitive form being the regular octohedron; it is of a slightly greyish-white colour, very brilliant when freshly broken; it is very brittle, and may be reduced to an impalpable powder; its specific gravity varies from 6·71 to 6·86: when perfectly pure it is 6·715. When rubbed, or volatilized, it exhales a peculiar odour, and it also possesses a distinctly marked taste. It fuses at 806°, and volatilizes at higher temperatures, although very slightly under the pressure of its own vapour, so that it cannot be distilled. Like alumina, its most important oxide is a teroxide, and its equivalent number is consequently 129.

There are but two oxides of antimony, the protoxide or teroxide, and antimonic acid, or pentaoxide of antimony, although two others have been described. The first of these, the salifiable oxide of antimony, may be procured by boiling the precipitated oxychloride, *powder of Algaroth*, or the sulphate, with an alkali or its carbonate, then washing and drying the resulting oxide. It is insoluble in water, slightly soluble in most acids, readily so in hydrochloric acid, from which solution water precipitates the oxychloride already mentioned, dissolves in a solution of bitartrate of potash, and combines with the alkalis. It is composed of

One equivalent of Antimony..........		129	or 84·31
Three „ of Oxygen	8×3=	24	„ 15·69
Equivalent........		153.	100·

Formula...... $Sb\,O^3$.

Antimonic acid is obtained by treating antimony with aqua-regia, evaporating the solution nearly to dryness, adding to this nitric acid of sp. gr. 1·5, expelling any excess of acid by heat, and washing the product in abundance of water; this process affords hydrated antimonic acid, which reddens litmus paper, is almost insoluble in the acids, excepting hydrochloric acid, expels the acid of the carbonated alkalis, forming with potash a salt which is readily soluble in boiling water, and with soda an insoluble salt. Antimonic acid consists of

One equivalent of Antimony..........		129	or 76·33
Five „ of Oxygen	8×5=	40	„ 23·67
Equivalent		169.	100·

Formula...... $Sb\,O^5$.

The antimoniate of potash is a valuable test for detecting the presence of soda.

Antimony under certain circumstances combines with hydrogen, but our knowledge of this combination is at present somewhat uncertain and incomplete; yet is it necessary in medico-legal investigations to keep this fact in remembrance, lest a false conclusion should be drawn from the production of a metallic stain on porcelain or glass by ignited hydrogen. This metal combines with sulphur in the same proportions as with oxygen, forming a tersulphuret and a pentasulphuret; of these the first is the only one of importance in a pharmaceutical view.

ANTIMONII OXYSULPHURETUM.

Oxysulphuret of Antimony.

Sulphur Antimonii Præcipitatum, P.L. 1746, P.L. 1788.
Antimonii Sulphuretum Præcipitatum, P.L. 1809, P.L. 1824.
Antimonii Oxysulphuretum, P.L. 1836.

Take of Tersulphuret of Antimony, powdered, seven ounces,
Solution of Soda four pints,
Distilled Water two gallons,
Diluted Sulphuric Acid as much as may be sufficient;

Mix the Tersulphuret and Soda with the Water, and boil with a slow fire for two hours, frequently stirring, distilled Water being often added, that it may fill about the same measure. Strain the solution, and gradually pour into it as much diluted Sulphuric Acid as may be sufficient to precipitate the Oxysulphuret of Antimony; then, with water, wash away the Sulphate of Soda, and dry what remains with a gentle heat.

Golden-red; in boiling Solution of Potash completely, in hot Hydrochloric Acid almost completely dissolved, evolving Hydrosulphuric Acid, and a little sulphur being left. These solutions are colourless.

Remarks.—TERSULPHURET OF ANTIMONY, the Sesquisulphuret of Antimony of the last Pharmacopœia, is a brittle, bluish-grey substance of a striated or acicular crystalline appearance, and metallic lustre; its primary form is a right rhombic prism: its specific gravity is 4·62. When pure it is composed of—

One equivalent of Antimony		129	or 72·88
Three „ of Sulphur	16×3=	48	„ 27·12
Equivalent....		177·	100·

Formula.... $Sb\,S^3$.

This compound is more readily acted upon by acids than metallic antimony; the fixed alkalis also exert an energetic action on it. It is upon this action that the process above given for making the oxysulphuret of antimony depends.

Process.—The formation of oxysulphuret of antimony has engaged the attention of the most distinguished chemists, and as yet the subject is involved in some obscurity; it is however probable, that when an alkaline solution, in this case a solution of oxide of sodium, acts upon tersulphuret of antimony, a partial interchange of elements takes place; a portion of the oxygen of the oxide of sodium uniting with a portion of the antimony of the tersulphuret, whilst the sodium combines with the sulphur of the tersulphuret thus set free, and forms a sulphuret of sodium; this last dissolves another portion of sulphuret of antimony, forming with it a soluble double sulphuret of antimony and sodium; whilst the oxide of antimony combines with a portion of the undecomposed soda, and this compound dissolves together with the double sulphuret; this solution on the addition of sulphuric acid is again decomposed, the soda unites with the acid and precipitates oxide of antimony, whilst the double sulphuret is converted into sulphate of soda and hydrated sulphuret of antimony, so that the precipitate consists of a mixture of oxide and sulphuret of antimony and of water.

Properties and Composition.—This preparation is of a bright orange colour, its taste is slightly styptic. It is insoluble in water, and the greater portion is not readily acted upon by dilute acids. It is decomposed by the action of light, and therefore should be kept in coloured glass bottles. This oxysulphuret must be regarded as a mixture and not as a definite compound, for when boiled with bitartrate of potash the oxide of antimony is dissolved without the sulphuret being decomposed, nor is it constant in composition. My analysis gives very nearly the following composition:—

				Analysis.
One equivalent of Teroxide of Antimony		153	or 13·04	=12·
Five „ of Tersulphuret of Antimony	177× 5=	885	„ 75·36	=76·5
Fifteen „ of Water	9×15=	135	„ 11·60	=11·5
		1173	100·	100·

This, which is the nearest approach to its composition my analysis indicates, tends however to support the opinion that this preparation is a mere mixture of the oxide and sulphuret, the most remarkable feature in it being that the number of equivalents of sulphur and of water in this compound are equal.

Adulterations, Impurities and Tests.—Neither the metal, the tersulphuret, nor the oxysulphuret is very liable to adulteration, especially if the two former be bought in lump and not in powder; but they are frequently impure owing to the presence of various other metals. Sulphuret of antimony should completely dissolve in hydrochloric acid, yielding a colourless solution, which poured into a large quantity of water affords an abundant white precipitate, the oxychloride; the clear aqueous solution should give a bright orange-coloured precipitate with hydrosulphuric acid, this latter being the characteristic test of antimony. The solution should not be coloured when after separation of the orange-coloured precipitate, the hydrosulphuric acid being in excess, ammonia is added to the solution. In a pharmaceutical view, it is however most important to ascertain its freedom from arsenic. The presence of this metal is best detected by a modification of Marsh's test. Pass the gas liberated by the action of sulphuric acid and zinc, mixed with a solution of the antimonial salt, through a hard glass tube heated to redness at one part by a spirit-lamp. The reduced antimony is deposited nearer the heated part than the arsenic is, and on both sides of the tube. A solution of hypochlorite of lime or of soda will dissolve any arsenic, which may be then recognized by its characteristic tests, but these do not act upon the antimony; (Bischoff). By exposure to the vapour of iodine at ordinary temperatures, an arsenical stain assumes a yellow-brown tint changing in the air to a lemon-yellow, which subsequently disappears, especially if gently heated. Antimonial stains under the same circumstances assume a deep reddish-yellow turning orange by exposure to air, which colour is permanent; (Lassaigne). If the metallic stains are again heated to redness and atmospheric air allowed access to the tube, and the white sublimates treated with a little water to which one or two drops of ammonia have been added, the solution neutralized with acetic acid, if arsenic be present, will give the characteristic yellow and green precipitates with ammonio-nitrate of silver and ammonio-sulphate of copper. The metallic stain, treated with nitric acid and neutralized by ammonia, will give a brick-red precipitate with the ammonio-nitrate of silver, if arsenic be present.

Pharmacopœia Preparations.—Of the Tersulphuret, Antimonii Oxysulphuretum, Antimonii Potassio-Tartras, Pulvis Antimonii Compositus. Of the Oxysulphuret, Pilula Hydrargyri Chloridi Composita.

Medicinal Uses of the Oxysulphuret.—It is but seldom employed, excepting in the last-named preparation, being, on account of its variable composition, less certain in its operation than other antimonials.

Dose.—In herpetic and other eruptions, from gr. j. to gr. iv. twice a day. In larger doses it is emetic.

ANTIMONII POTASSIO-TARTRAS.

Potassio-tartrate of Antimony.

Tartarus Emeticus, P.L. 1721.
Tartarum Emeticum, P.L. 1746.
Antimonium Tartarizatum, P.L. 1788, P.L. 1809, P.L. 1824.
Antimonii Potassio-Tartras, P.L. 1836.

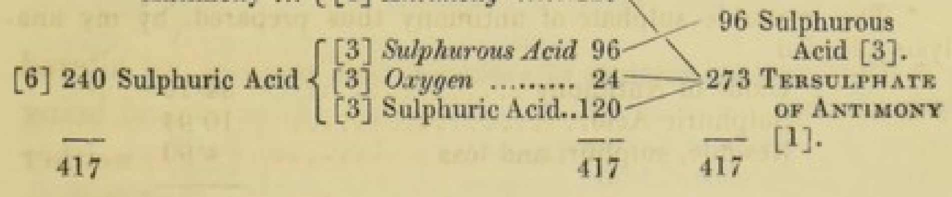
Take of Tersulphuret of Antimony, rubbed to the finest powder, a pound,
Sulphuric Acid fifteen fluidounces,
Bitartrate of Potash ten ounces,
Distilled Water five pints;

Mix the Tersulphuret with the Acid in an iron vessel, to these apply a slow fire beneath a chimney, stirring frequently with an iron spatula; then increase the fire, until the flame of the ignited sulphur being extinguished, nothing remains excepting a whitish pulverulent mass. Wash this when cold with water until no acid can be detected, and dry. Carefully mix nine ounces of this salt with the Bitartrate and boil in the Water for half an hour. Strain the solution whilst still hot, and set aside that crystals may form. The solution being poured off, dry these, and again evaporate the solution that it may be converted into crystals.

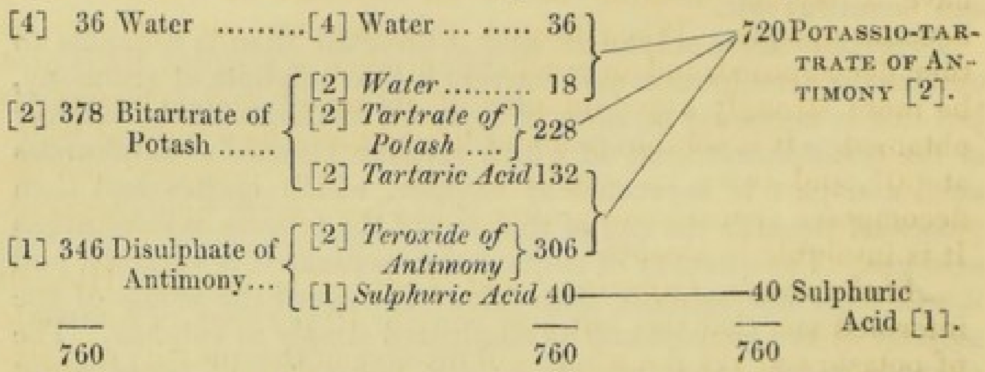
Colourless, soluble in water. This solution is not altered by ferrocyanide of potassium. Hydrosulphuric acid being added, a reddish-coloured substance is precipitated; neither chloride of barium nor nitrate of silver being added throws down anything, but what is again dissolved by the addition of water. That thrown down by Nitric acid, excess of the same acid redissolves. From 100 grains dissolved in water, hydrosulphuric acid precipitates 49 grains of tersulphuret of antimony.

Remarks.—The method of procuring the oxide of antimony in this process has been completely and most advantageously altered from that directed in the last Pharmacopœia; the process altogether is much simplified and improved, affording a very pure and beautiful salt.

Process.—More sulphuric acid is directed than is requisite to oxidize the tersulphuret and convert it into sulphate of antimony, but this is necessary to allow of a partial oxidation of the sulphur of the tersulphuret, part of which sulphur escapes as sulphurous acid, and part is separated as sulphur, which ignites and then passes off towards the end of this part of the process as sulphurous acid gas. The quantity of sulphur thus separated is variable, and it will therefore be more convenient to regard the whole of the sulphur of the tersulphuret as eliminated simply as sulphur. The changes which occur are these: one equivalent of tersulphuret of antimony 177 is composed of one eq. of *antimony* 129, and three eqs. of *sulphur* 48. As the water of the sulphuric acid is merely evaporated and plays no part in the decomposition, I shall regard for convenience' sake this acid as anhydrous, three eqs. of which 120 may be considered as composed of three eqs. of *oxygen* 24, and three eqs. of *sulphurous acid* 96. When the sulphuret and acid act upon each other, they are mutually decomposed, the one eq. of antimony 129, combines with the three eqs. of oxygen 24, to form one eq. of teroxide of antimony 153, and the three eqs. of sulphur 48, set free subsequently ignite and escape as sulphurous acid gas; whilst the three eqs. of sulphurous acid 96, eliminated from the sulphuric acid, are driven off in dense suffocating fumes. The one eq. of teroxide of antimony 153 thus formed combines with three other and undecomposed eqs. of sulphuric acid 120 to form one eq. of tersulphate of antimony 273, the whitish-brown pulverulent mass of the process.



These 273 of tersulphate, on the addition of water, are converted into a small portion of soluble supersulphate, and an insoluble subsulphate; which latter, by continued washing, is converted into an anhydrous disulphate*. When one eq. of dry disulphate of antimony 346, composed of two eqs. of *teroxide of antimony* 306, and one eq. of *sulphuric acid* 40, is boiled with two eqs. of bitartrate of potash 378, consisting of two eqs. of *tartrate of potash* 228, two eqs. of *tartaric acid* 132, and two eqs. of *water* 18, the two eqs. of tartaric acid 132 combine with the two eqs. of teroxide of antimony 306, and form two eqs. of tartrate of antimony 438, which uniting with the two eqs. of tartrate of potash 228, and six eqs. of water 54, form two eqs. 720 of crystallized POTASSIO-TARTRATE OF ANTIMONY, the one eq. of sulphuric acid 40 remaining in the mother-liquor.

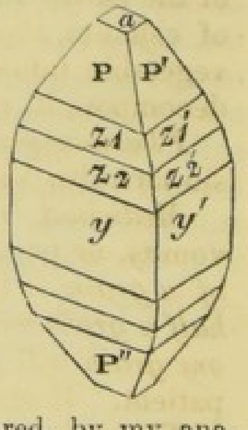


Composition.—Potassio-tartrate of antimony is therefore composed of

One equivalent	of Tartrate of Antimony	219	or	60·83
One ,,	of Tartrate of Potash ..	114	,,	31·67
Three ,,	of Water ...... 9×3=	27	,,	7·50
	Equivalent.........	360		100·

Formula...... $SbO^3, C^4 H^2 O^5; KO, C^4 H^2 O^5; 3HO$.

Properties.—Potassio-tartrate of antimony crystallizes with great facility, and the general character of the crystals of this compound is that of an *octahedron with a rhombic base.* One distinct cleavage only has been obtained, which is parallel to the plane *a* of the accompanying figure. The planes *z* and *y* are generally striated.



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* The insoluble sulphate of antimony thus prepared, by my analysis afforded

Oxide of Antimony	84·16
Sulphuric Acid....................	10·94
Residue, sulphur, and loss	4·90
	100·

which indicates the composition assigned to this salt in the text.—ED.

The following are the nearest to coinciding measurements taken on several crystals:

P on P'	108°	16′	
P over the edge on the left	104	15	
P on z^1	166	40	
P on z^2	165	40	nearly.
a on P, or P'	122	00	
a on y	90	00	

The crystals of this salt are colourless and inodorous, but have a styptic metallic taste: on exposure to the air, they become opaque. When heated, this salt first decrepitates, is then decomposed, and an excellent pyrophorus results; if the heat be more strongly urged an alloy of antimony and potassium is obtained. It is soluble in about fifteen times its weight of water at 60°, and twice its weight at 212°. The aqueous solution decomposes spontaneously after it has been some time prepared. It is insoluble in alcohol.

Adulterations, Impurities, and Tests.—The late Mr. Hennell informed me, that this salt may contain 10 per cent. of bitartrate of potash, and yet the whole will dissolve in the quantity of water required for the solution of the potassio-tartrate of antimony. In order to detect any uncombined bitartrate, add a few drops of a solution of carbonate of soda to a boiling solution of the antimonial salt, and if the precipitate formed be not redissolved, there is no bitartrate of potash present. For other tests, see Note in the text, and also ANTIMONII OXYSULPHURETUM.

Incompatibles.—The solution of potassio-tartrate of antimony is decomposed by acids, by alkalis and their carbonates, by some of the earths and metals, and their oxides, by lime-water, chloride of calcium, the acetates of lead, and tincture of galls. Many vegetable infusions, and especially those which are astringent, decompose it, such as cinchona, rhubarb, catechu, &c.

Pharmacopœia Preparations.—Unguentum Antimonii Potassio-tartratis, Vinum Antimonii Potassio-tartratis.

Medicinal Uses.—Potassio-tartrate of antimony either sweats, vomits, or purges, according to the quantity exhibited. A *quarter of a grain*, if the skin be kept warm, will promote diaphoresis; *half a grain* will first prove purgative, and then diaphoretic; and *one grain* will generally vomit, then purge, and lastly sweat the patient. It may be given in solution.

This being the first mentioned and most important of the tartrates inserted in the Pharmacopœia Preparations, I shall in this place consider the mode of preparing Tartaric acid, its source Bitartrate of Potash, and the neutral salt of that alkali, Tartrate of Potash.

ACIDUM TARTARICUM, P.L. 1836.

Tartaric Acid.

Acidum Tartaricum, P.L. 1824.

Take of Bitartrate of Potash four pounds,
Distilled Water, boiling, two gallons and a half,
Prepared Chalk twenty-five ounces and six drachms,
Diluted Sulphuric Acid seven pints and seventeen fluidounces,*
Hydrochloric Acid twenty-six fluidounces and a half, or as much as may be sufficient ;

Boil the Bitartrate of Potash with two gallons of the distilled water, and add gradually half of the prepared Chalk; afterwards, the effervescence having ceased, add the remainder of the Chalk first dissolved in the Hydrochloric Acid with four pints of the distilled water. Lastly, set by the mixture that the Tartrate of Lime may subside ; pour off the liquor, and wash the Tartrate of Lime frequently with distilled water, till it is free from taste. Then pour on it the diluted Sulphuric Acid, and boil them for a quarter of an hour. Evaporate the strained liquor with a gentle heat, that crystals may be formed.

Dissolve the crystals, that they may be pure, again and a third time in water, and strain the solution as often, boil down, and set it aside to crystallize.

Remark.—In the diagrams illustrative of the preparation of tartaric acid, all the acids and salts are considered and represented as anhydrous.

Process.—The Tartaric Acid of the bitartrate of potash is by two distinct operations converted into tartrate of lime. When half of the chalk or carbonate of lime one eq. 50 is added, as directed, to the whole of the bitartrate of potash one eq. 180, one half of the acid or one eq. 66, which it contains, acts as a free

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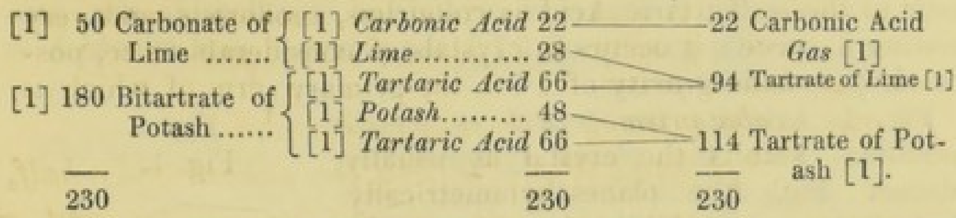
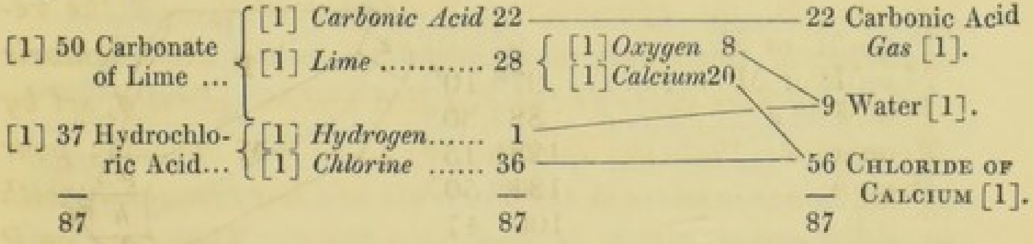
* The strength of this acid compared with the present is as 28 to 27, consequently nearly f℥vj of the Diluted Sulphuric Acid P.L. in addition are required to equal the strength of the quantity of the Acid of P.L. 1836, ordered in the text.

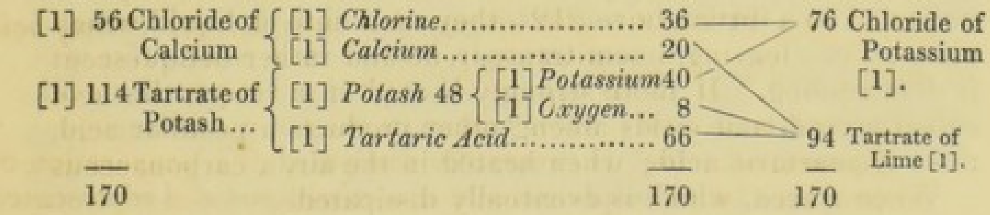
acid, one eq. 22 of carbonic acid is expelled, and one eq. 94 of tartrate of lime formed, which being a salt of little solubility is precipitated ; there remains in solution one eq. 114 of neutral tartrate of potash, as shown by the annexed diagram :



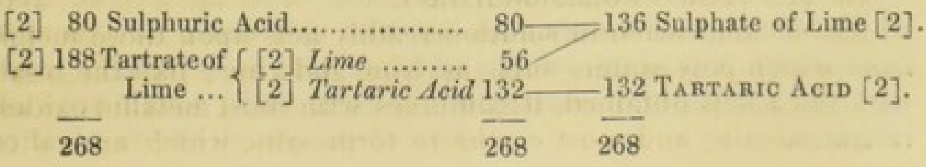
The next step in the process is to prepare the solution of chloride of calcium for the purpose of decomposing the neutral tartrate of potash formed in the preceding operation ; to effect this the remaining half of the chalk 50 or one eq., consisting of one eq. of *carbonic acid* 22, one eq. of *calcium* 20, and one eq. of *oxygen* 8, is decomposed by one eq. of hydrochloric acid 37, composed of one eq. of *chlorine* 36, and one eq. of *hydrogen* 1, and gives rise to an eq. each of carbonic acid 22, water 9, and CHLORIDE OF CALCIUM 56, as will appear by the following diagram :



When the solution of chloride of calcium is mixed with that of the neutral tartrate of potash, double decomposition ensues, and a complete interchange of the constituents of the two salts takes place, which the annexed diagram will illustrate without requiring a verbal description.



These two eqs. of tartrate of lime 188 are decomposed by two eqs. of sulphuric acid 80, forming two eqs. of sulphate of lime 136, and two eqs. of TARTARIC ACID 132, as is explained in the subjoined diagram.



The solution of tartaric acid by evaporation yields crystals, which are purified from their colouring matter by repeatedly dissolving and crystallizing as directed.

Properties.—Tartaric Acid is colourless, inodorous, and very sour to the taste; it occurs in crystals of considerable size, possessing a specific gravity of 1·75, the primary form of which is *an oblique rhombic prism.*

Fig. 1. exhibits the crystal as usually modified, with the planes symmetrically placed. Fig. 2. exhibits the same modified form, with the planes irregularly disposed, as they appear in most of the crystals, the corresponding planes in both being marked with the same letters. This affords another instance of irregularity, which renders it not easy immediately to perceive the relations of the several planes to each other.

Fig. 1.

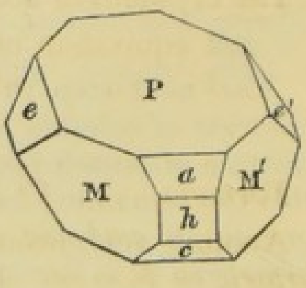
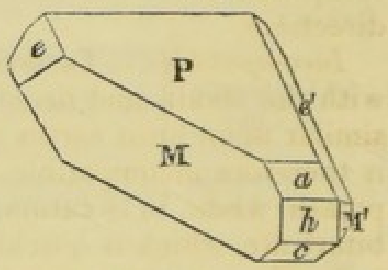


Fig. 2.



P on M, or M'	97°	10'
M on M'	88	30
P on *e* or *e'*	128	15
P on *a*	134	50
P on *h*	100	47

Tartaric Acid suffers no change by exposure to the air; water at 60° dissolves about one-fifth, and at 212° twice its weight; the solution acts strongly upon vegetable blue colours; it decomposes and becomes mouldy by keeping. It is soluble in alcohol, but more sparingly so than in water. When the crystals are heated to a little above 212°, they melt into a liquid which boils at 250°, leaving a semitransparent and rather deliquescent mass on cooling. If more strongly heated in a retort, this acid is decomposed, and yields among other products a peculiar acid, called pyrotartaric acid; when heated in the air, a carbonaceous mass is procured, which is eventually dissipated.

When treated with sulphuric acid it is decomposed, and acetic acid is obtained; by nitric acid it also suffers decomposition, and a portion of its carbon combines with sufficient oxygen to convert it into oxalic acid. Tartaric acid has a tendency to form double salts (Sodæ Potassio-tartras).

Tartaric Acid when in solution readily acts upon those metals which decompose water, such as iron and zinc; like the bisalt from which it is obtained, it combines with most metallic oxides, with the alkalis, and most earths to form salts, which are called tartrates.

Composition.—Anhydrous Tartaric Acid is composed of

Four equivalents of Carbon	6×4=24	or	36·4
Two ,, of Hydrogen	1×2= 2	,,	3·0
Five ,, of Oxygen	8×5=40	,,	60·6
Equivalent	66.		100·

Formula...... $C^4 H^2 O^5$.

The crystallized acid consists of

1 equivalent of Anhydrous Acid	66	or	88
1 ,, of Water	9	,,	12
Equivalent	75.		100·

Formula...... $C^4 H^2 O^5$, HO.

Another acid, isomeric with tartaric acid, and termed *Paratartaric* or *Racemic Acid*, has also been procured from a particular description of "cream of tartar;" it is less soluble than Tartaric acid. Racemic acid, according to M. Pasteur, is itself composed of two isomeric acids which polarize light in opposite directions.

Incompatibles.—Tartaric Acid, as already noticed, combines with the alkalis and decomposes their carbonates; its effects are similar upon most earths and oxides and their carbonates, and it is therefore incompatible with them. It decomposes the salts of potash when in solution, converting part of the potash into bitartrate, which is quickly precipitated in minute crystals: this is its characteristic test; the solution also gives immediate precipitates with lime-water, the salts of lime and of lead; and when tartrate of soda is heated with a solution of chloride of platinum, metallic platinum is precipitated in the state of a black powder.

Adulteration, Impurities and Tests.—See MATERIA MEDICA: *Acidum Tartaricum.* It should leave no ash when ignited. Bitartrate of potash, and an acid sulphate of potash have been used as adulterants when in powder.

Medicinal Uses.—This acid being cheaper than citric acid, it is sometimes employed instead of it, especially in preparing what are called sodaic powders, used as substitutes for soda water. It is largely used in calico-printing.

BITARTRATE OF POTASH, sometimes called Supertartrate of Potash, Tartar, or Cream of Tartar, is a well-known acidulous salt deposited from wine; it occurs in the state of small colourless hard crystals, which are very sparingly soluble in water. In its original impure state it is called *argol*, and is of a yellowish or red colour, according to that of the wine which yields it. It contains tartrate of lime, colouring matter, and other impurities, from which it is partly freed by solution in boiling water, and crystallization as the solution cools.

Properties.—Bitartrate of Potash is colourless, inodorous, and has a sour taste; when dissolved in water the solution reddens litmus paper; it requires 60 parts of cold and 15 of boiling water to dissolve one part of it*; if the solution be exposed to the air, the tartaric acid is decomposed, and carbonate of potash is formed. If calcined in an open fire it leaves carbonate of potash, mixed with a little lime derived from the tartrate of lime, of which it generally contains about 5 per cent†.

The primary form of the crystal of bitartrate of potash is a *right rhombic prism*: the first of the annexed figures represents the planes of its ordinary crystal in a perfect state; M and M′ are the lateral primary planes, and the crystals admit of cleavage parallel to those planes, and to the plane *h*, which is parallel to the shorter diagonal of the primary prism; it also cleaves parallel to the longer diagonal. The crystals are not, however, commonly so perfect as this figure, nor indeed is it usual to observe all its planes; for owing to the extraordinary enlargement of certain of them, others are either much diminished, or totally disappear. The common crystals are represented by the second figure; and in observing them, it must be recollected that the plane *h* is constantly striated, as represented in both figures.

Fig. 1.

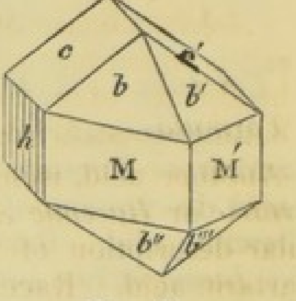
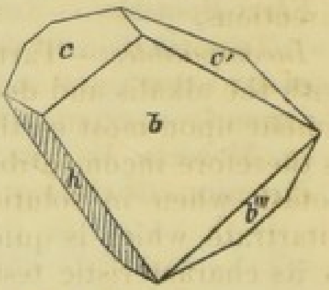


Fig. 2.



M on M′	170° 30′
—— *h*	26 15
—— *b*	17 2
b on b'''	74 0
b on c	141 25
b on c'	103 18
c on h	125 30
c on c'	109 0

Liebig, whose views are adopted by most British chemists, regards Tartaric Acid as a *bibasic* acid, by which the neutral tartrate of potash becomes a subsalt, and the acid salt a neutral

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* Authorities differ widely as to the solubility of this salt, nor do they agree respecting the solubility of Tartaric Acid.—Ed.

† Bitartrate of potash is very soluble in hydrochloric acid, especially with the assistance of heat. When such a solution is cooled very gradually, as by leaving it at perfect rest in a covered vessel on a sand-bath, allowing the fire to burn out and the whole to cool, most beautiful, brilliant and transparent crystals are formed, frequently as large as the figures of this salt above given.—Ed.

one. I however prefer to consider this acid as monobasic as heretofore, and to follow the opinion held by Berzelius, Dumas and that adopted by the College of Physicians, they retaining the term Bitartrate of Potash. In accordance with this view we must regard bitartrate of potash as composed of

One equivalent of Potash	....	48	or 25·3
Two „ of Tartaric Acid	..	66×2=132	„ 70·0
One „ of Water	....	9	„ 4·7
Equivalent	......	189.	100·

Formula...... KO, $2C^4H^2O^5$, HO.

Adulterations, Impurities, and Tests.—When in powder this salt is sometimes adulterated with sand, carbonate of lime, alum, bisulphate of potash and flour. It should totally dissolve in boiling water, without effervescence, give no precipitate on the addition of ammonia, the cold solution should be but pleasantly acid to the taste, and yield a precipitate with acetate of lead readily soluble in nitric acid.

Incompatibles.—See TARTARIC ACID.

Pharmacopœia Preparations.— Antimonii Potassio-Tartras, Ferri Potassio-Tartras, Pulvis Jalapæ Compositus.

Tartaric acid forms a definite salt with one-half the quantity of acid contained in bitartrate of potash. This preparation was formerly inserted in the body of the work but is now transferred to Materia Medica. In pursuance of my plan I subjoin the directions of the last Pharmacopœia for preparing

POTASSÆ TARTRAS, P.L. 1836.

Tartrate of Potash.

Tartarum Solubile, P.L. 1746.
Kali Tartarizatum, P.L. 1788.
Potassæ Tartras, P.L. 1809, P.L. 1824.

Take of Bitartrate of Potash, powdered, three pounds,
Carbonate of Potash sixteen ounces, or as much as may be sufficient,
Water, boiling, six pints;

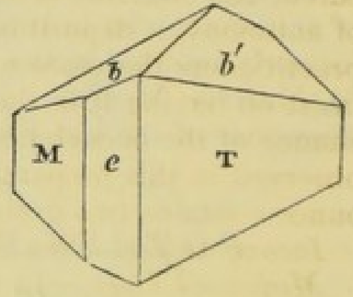
Dissolve the Carbonate of Potash in the boiling Water, then add the Bitartrate of Potash, and boil. Strain the liquor, and afterwards boil it down until a pellicle floats, and set it aside that crystals may be formed. The liquor being poured off, dry these, and again evaporate the liquor that crystals may be produced.

Process.—The nature and composition of carbonate of potash will be stated hereafter; when it and bitartrate of potash act upon each other, one eq. 66 of the *tartaric acid* in the bitartrate of potash combines with the one eq. 48 of the *potash* of the carbonate and expels its one eq. 22 of *carbonic acid* in the gaseous state; so that from one eq. of each, two eqs. of neutral tartrate of of potash are produced. Both salts are regarded as anhydrous in the following diagram.

[1] 70 Carbonate of Potash. { [1] *Carbonic Acid* 22 ——— 22 Carbonic Acid *Gas* [1].
{ [1] *Potash* .... 48 ———
[1] 180 Bitartrate of Potash. ——— 228 TARTRATE OF POTASH [2].
250 ——— 250

Properties.—This salt has a saline bitter taste; it is soluble in less than twice its weight of water, and hence its former name of *soluble tartar*, to distinguish it from common tartar, which is the bitartrate of potash; it is nearly insoluble in alcohol. In a damp atmosphere it attracts moisture; by a red heat it is decomposed and converted into carbonate of potash. It is commonly met with in the shops in the state of powder, but it ought always to be crystallized. When this salt has been properly prepared it does not affect either litmus or turmeric paper.

The primary form of tartrate of potash is a *right oblique-angled prism*, with cleavages parallel to the lateral planes.



M on T.	89° 30′
M on *e*	142 13
M on *b*	107 30
T on *e*.	127 17
T on *b′*	103 40

Composition.—Tartrate of Potash consists of

One equivalent of Potash	48	or 42·1
One equivalent of Tartaric Acid	66	„ 57·9
Equivalent.	114.	100·

Formula. . . . . . $KO, C^4 H^2 O^5$.

Impurities and Tests.—See MATERIA MEDICA: *Potassæ Tartras.* It is seldom adulterated.

Incompatibles.—Tartrate of Potash is decomposed by most acids, and many acidulous salts, for when added to a solution of it, they occasion the formation of bitartrate of potash. It is decomposed by lime-water and chloride of calcium, and by solutions of lead and silver, &c.

Medicinal Uses.—It is a mild and efficient purgative, and when given with resinous purgatives or senna, it corrects their griping properties by accelerating their operation. Dose, ʒj. to ℥j. in solution.

VINUM ANTIMONII POTASSIO-TARTRATIS.

Wine of Potassio-tartrate of Antimony.

Vinum Antimonii Tartarisati, P.L. 1788.
Liquor Antimonii Tartarizati, P.L. 1809.
Vinum Antimonii Tartarizati, P.L. 1824.
Vinum Antimonii Potassio-tartratis, P.L. 1836.

Take of the crystals of Potassio-tartrate of Antimony two scruples,
Sherry Wine a pint;
Rub the Crystals to powder, and dissolve.

Remarks.—When the antimonial salt has been carelessly prepared, and contains bitartrate of potash uncombined with oxide of antimony, a deposit is apt to be formed in this solution; those practitioners therefore who purchase the potassio-tartrate should insist on having it in the state of crystals, in which there is less chance of the occurrence of this imperfection. If any deposit be observed in this preparation, it ought to be rejected; each fluid-ounce contains two grains of the potassio-tartrate.

Incompatibles.—See ANTIMONII POTASSIO-TARTRAS.

Medicinal Uses.—In doses of ♏xv. to f℥j. it acts as a diaphoretic when given with saline medicines, warm drinks, &c.

PULVIS ANTIMONII COMPOSITUS.

Compound Powder of Antimony.

Pulvis Antimonialis, P.L. 1788, P.L. 1809, P.L. 1824.
Pulvis Antimonii Compositus, P.L. 1836.

Take of Tersulphuret of Antimony, powdered, a pound,
Horn shavings, two pounds;

Mix and throw them into a crucible red-hot in the fire, and stir constantly until vapour no longer arises. Rub the residue to powder, and put it into a crucible. Then apply fire, and increase it gradually that it may be red-hot for two hours. Grind the residual powder as fine as possible.

Remarks.—In this process, when the sulphuret and horn are heated together, the sulphur is expelled in vapour; and the antimony combines with the oxygen of the air. The gelatinous animal matter is dissipated by the heat, but the phosphate of lime suffers no change, and there remains in the crucible a mixture of *antimoniate of antimony*, formerly called antimonious acid, and phosphate of lime, forming Pulvis Antimonii Compositus.

Properties.—This preparation is an inodorous insipid powder, of a dull white colour. It is insoluble in water, and only partially soluble in acids; if, however, the antimony it contains were in the state of teroxide, as has been stated by some writers, then hydrochloric acid, when heated, would entirely dissolve it.

Composition.—In consequence of Dr. Elliotson's statement that he had exhibited upwards of 100 grains of this medicine without producing any effect, I procured specimens of it from two respectable sources, and subjected them to analysis. I found one of them to consist of

Antimoniate of Antimony	35
Phosphate of Lime	65
	100

The other yielded

Antimoniate of Antimony	38
Phosphate of Lime	62
	100

I have also analysed James's powder, of which the Pulvis Antimonii Compositus is an imitation, and found it to consist nearly of

Antimoniate of Antimony	56
Phosphate of Lime	44
	100

These proportions agree almost exactly with the results obtained by Dr. Pearson; and the high state of oxidation of the antimony will fully account for the inactivity of both preparations.

According to Berzelius and Dr. Maclagan, these preparations contain a little antimoniate of lime, the base of which appears to be derived from the decomposition of the carbonate contained in the horn or in the bone substituted for it.

Adulteration.—No doubt can be entertained that this preparation, like every other, has been sophisticated; but owing to want of power in the genuine article, the practitioner probably has not been disappointed by its adulteration.

Medicinal Uses.—It is stated to be diaphoretic, alterative, emetic, or purgative, according to the extent of the dose and the state of the patient. The doses mentioned are from gr. v. to gr. x. It is worth the consideration of the practitioner, whether the employment of this preparation may not be altogether superseded by the more efficient and certain potassio-tartrate of antimony.

PRÆPARATA EX ARSENICO.

PREPARATIONS OF ARSENIC.

Remarks.—ARSENIC is a metal which is readily procured by subliming at a red heat a mixture of arsenious acid and charcoal, or of one part of arsenious acid and three parts of *black-flux*. Thus obtained it is a very brittle metal of a steel grey colour, and when freshly broken of considerable lustre. Its specific gravity is 5·7, but under certain circumstances 5·959. It begins to volatilize without fusing at 356°, yielding a colourless gas of marked alliaceous odour of specific gravity 10·39, and which according to Mitscherlich condenses in rhombohedral crystals, and burns with a pale blue flame. Arsenic combines with hydrogen forming a most deadly gas, which has already been noticed under PREPARATIONS OF ANTIMONY. There are two oxides of arsenic, both of which form salifiable compounds, and are consequently ranked as acids.

Arsenious Acid, which is the oxide employed in the Pharmacopœia, is met with in commerce, and is composed of

One equivalent of Arsenic	75	or 75·76
Three „ of Oxygen	8×3=24	„ 24·24
Equivalent	99.	100·

Formula. . . . . . AsO^3.

Properties.—Arsenious acid is frequently called *oxide of arsenic, white arsenic*, or merely *arsenic* ; the last term belonging in strictness only to the metal: it is procured chiefly in Cornwall and Saxony, by roasting certain ores which contain it ; this substance occurs in large colourless pieces, which are usually opaque ; but internally, when recently broken, they are sometimes transparent, and have the appearance of a colourless or yellowish glass. When recently sublimed, it always presents this glacial appearance ; it is moderately hard and brittle ; it is inodorous, has scarcely any taste, and is extremely poisonous. Its specific gravity, when transparent, I find to be 3·715, and when opaque 3·620 ; the opacity I believe to be owing to the absorption of water from the atmosphere*. Arsenious acid is volatilized at the temperature of about 380°, and when thus vaporized it is inodorous, although often stated to possess an alliaceous smell, which belongs only to volatilized metallic arsenic. A thousand parts of water at mean temperatures, are said to dissolve 9·6 parts of transparent, and 12·5 of opaque arsenious acid in 36 hours ; the same quantity of boiling water dissolves 97 parts of the transparent kind, of which 18 are retained on cooling and 79 deposited in the state of small crystals, the form of which is the regular octahedron. The subject of the solubility of arsenious acid in water is, however, one on which chemists are not yet agreed. The solution of arsenious acid reddens litmus paper slightly, and it combines with the alkalis, potash and soda, with great facility, forming compounds which are called *arsenites*.

Arsenic Acid occurs in nature combined with various metallic

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* This opacity is certainly coincident with absorption of water, and this is probably the agent which sets up the molecular re-arrangement of the arsenious acid, to which, it now appears probable, this opacity is really to be attributed ; the amorphous vitreous arsenious acid, by the action of small quantities of water, or elevation of temperature, being converted into the crystalline and opaque acid. The beautiful experiments of H. Rose, showing that vitreous arsenious acid crystallizes from its solutions in hydrochloric acid, emitting flashes of light, and then possesses the properties of the opaque modification of this acid, whilst the opaque variety under the same circumstances evinces no luminosity, prove these vitreous and opaque states to be distinct modifications of this acid.—Ed.

oxides; it may be prepared artificially by subjecting arsenic, or, which is preferable, arsenious acid, to the action of nitric acid; by the oxygen which the nitric acid yields during decomposition, the arsenic is perfectly acidified and converted into *arsenic acid*, which is readily soluble in water, and much more powerfully acid than arsenious acid. Its compounds are called *arseniates*. It is composed of

One equivalent of Arsenic		75	or 65·22
Five „ of Oxygen	8×5=	40	„ 34·78
Equivalent		115.	100·

Formula...... As O^5.

LIQUOR ARSENICI CHLORIDI.

Solution of Chloride of Arsenic.

Take of Arsenious Acid, broken into fragments, half a drachm,
Hydrochloric Acid a fluidrachm and a half,
Distilled Water a pint;

Boil the Arsenious Acid with the Hydrochloric Acid, mixed with an ounce [*fluidounce*] of the Water, until it is dissolved; then add as much water as may be requisite to exactly fill a pint measure.

This preparation is now for the first time inserted in the Pharmacopœia. A fluidounce contains a grain and a half of arsenious acid. As this acid dissolves in and re-crystallizes from its solution in hydrochloric acid unchanged, this preparation must be regarded as a solution of arsenious in hydrochloric acid, although partial decomposition may have ensued, and some chloride of arsenic and water have been formed by the interchange of the elements of the two acids.

Impurities, Adulterations, and Tests.—Solution of Chloride of Arsenic is not likely to be adulterated. It should be totally vaporized by heat, and give a golden-yellow precipitate with hydrosulphuric acid: under some circumstances a little time may elapse before this effect is produced. For tests of Arsenious Acid, see MATERIA MEDICA: *Acidum Arseniosum*. Marble and gypsum are used as adulterants; these, of course, are readily detected. For further tests and modes of discovering minute quantities of arsenic, I refer to chemical and toxicological authors.

Incompatibles.—The alkalis, their carbonates and sulphurets; most earths, metallic oxides and their salts, and many infusions, decoctions and tinctures.

Pharmacopœia Preparations of Arsenious Acid.—Liquor Arsenici Chloridi, Liquor Potassæ Arsenitis.

Medicinal Uses of Liquor Arsenici Chloridi, see Liquor Potassæ Arsenitis. Dose, ♏iij. to ♏x. three times a day. It is a highly poisonous preparation, and requires great care and watchfulness in exhibiting it.

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LIQUOR POTASSÆ ARSENITIS.

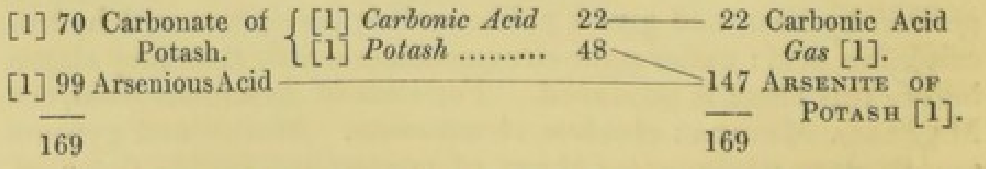
Solution of Arsenite of Potash.

Liquor Arsenicalis, P.L. 1809, P.L. 1824.
Liquor Potassæ Arsenitis, P.L. 1836.

Take of Arsenious Acid, broken into fragments,
Carbonate of Potash, each eighty grains,
Compound Tincture of Lavender five fluidrachms,
Distilled Water a pint;

Boil the Acid and Carbonate with half a pint of the Water until they are dissolved. To the cold solution add the Tincture; and lastly, as much Water as may be required to exactly fill a pint measure.

Process.—Liquor Potassæ Arsenitis is very readily prepared; a few minutes' ebullition of the ingredients in a Florence flask is sufficient to dissolve the arsenious acid; during solution carbonic acid gas is evolved. Neglecting the excess of carbonate of potash, and the water which it contains, the changes which take place may be thus represented:



The arsenious acid usually sold in powder should not be employed for this preparation; it is very commonly adulterated with sulphate and carbonate of lime, which being insoluble in the solution of carbonate of potash, the operator supposes that it is difficult to prepare this medicine. It contains four grains of arsenious acid in a fluidounce.

Incompatibles.—Acids and acidulous salts, hydrosulphuric acid, hydrosulphates, sulphuret of potassium and similar compounds after the addition of an acid; lime-water, earthy salts, such as alum, sulphate of magnesia, and chloride of calcium; metallic salts, as sulphate and sesquichloride of iron, nitrate of silver, and sulphate of copper; the decoctions of cinchona.

Medicinal Uses.—This solution is a powerful tonic; it is especially employed in intermittent and remittent fevers, periodic headaches, and some diseases of the skin. Dose, ♏iv. to ♏xv., twice a day. It is very poisonous.

PRÆPARATUM E BISMUTHO.

PREPARATION OF BISMUTH.

Remarks.—Bismuth is a metal which occurs in England and in several parts of the Continent of Europe. It is found native, and in the state of oxide, carbonate, and sulphuret. This metal is of a reddish white colour, has considerable lustre, but tarnishes readily, and its fracture exhibits a lamellar structure. When pure it crystallizes, by careful cooling from a state of fusion, in large and beautiful iridescent cubic crystals; its primary form however is the regular octohedron. It is moderately hard, very brittle, and may easily be reduced to powder; its specific gravity is 9·8; it fuses at 476°, solidifies at about 468°, dilating as water does when frozen. At a white heat it sublimes; its vapour takes fire in the air, burning with an obscure bluish flame, and is converted into a yellow smoke of teroxide, which is the first degree of oxidation of bismuth, the superior oxide being a pentaoxide and evincing acid properties. Under this view the equivalent of bismuth is 213, its symbol or formula being Bi.

The characteristic tests of Bismuth are the production of a basic insoluble salt on adding concentrated solutions of this metal to water; the brown coloured precipitates which dilute solutions afford with hydrosulphuric acid, and with iodide of potassium; and the white precipitates insoluble in excess of the precipitants yielded by the caustic alkalis.

Oxide (teroxide) *of Bismuth* is easily obtained by calcining the nitrate of this metal. Thus procured, it is of a pale yellow colour, fusible at a red heat, and may be combined with acids to form definitely constituted salts. It consists of

One equivalent of Bismuth	......	213	or 89·86
Three „ of Oxygen	.. 8 × 3 =	24	„ 10·14
	Equivalent....	237·	100·

Formula...... BiO^3.

Bismuthic Acid contains five eqs. of oxygen to one of metal, its equivalent being 253, and formula BiO^5.

BISMUTHI NITRAS.

Nitrate of Bismuth.

Bismuthi Subnitras, P.L. 1824.
Bismuthi Trisnitras, P.L. 1836.

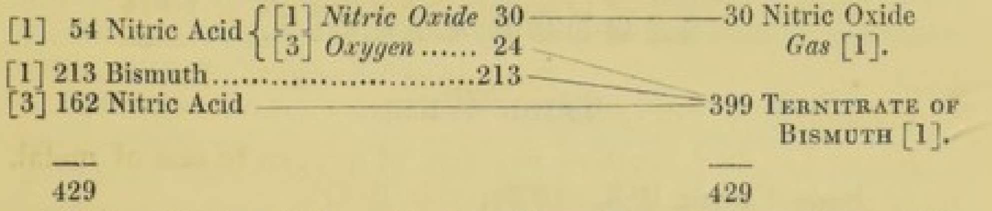
Take of Bismuth an ounce,
Nitric Acid a fluidounce and a half,
Distilled Water three pints;

Mix a fluidounce of the Water with the Acid, and the Bismuth being added, apply heat until it is dissolved. Pour the solution into the rest of the Water, and strain the mixture through linen, so that the powder may be separated. Wash this with Distilled Water, and dry it with a gentle heat.

It is dissolved without effervescence in nitric acid. Diluted sulphuric acid being added nothing is precipitated.

Process.—It has already been explained, see Acidum Phosphoricum Dilutum, that when nitric acid is employed to oxidize a metal or other elementary body, the acid is usually resolved, not into its constituent gases, but into oxygen and nitric oxide, nitrous gas; this is the case in the present instance, and what takes place will be readily understood by the following statement and diagram.

One eq. of nitric acid 54 is composed of one eq. of *nitric oxide* 30, and three eqs. of *oxygen* 24; when this acts upon one eq. of bismuth 213, one eq. of nitric oxide 30 is expelled in the gaseous state, whilst the three eqs. of oxygen 24 combine with the one eq. of bismuth 213 to form 237 or one eq. of teroxide of bismuth, and this combines with three eqs. of nitric acid 162 to form one eq. of TERNITRATE OF BISMUTH 399.



The ternitrate of bismuth thus formed crystallizes in quadrilateral prisms containing six eqs. of water, and its solution when poured into a large quantity of water, as directed in the formula above given, abandons the greater portion of its acid, and yields a brilliant white precipitate, which when properly dried is the Bismuthi Nitras of the Pharmacopœia, composed, according to my analysis, of

			Analysis.
One equivalent of Oxide of Bismuth	237	or 81·45	81·92
One „ of Nitric Acid	54	„ 18·55	18·36
Equivalent......	291.	100·	100·28

Formula...... Bi O^3, NO^5.

When dried by exposure to air it retains some water. It is by no means uniform in composition, more or less washing altering its constitution. This salt is the cosmetic known as *Pearl Powder*, Blanc d'Espagne, or Magistery of Bismuth; it is white, inodorous, tasteless, insoluble in water, rendered brownish black by hydrosulphuric acid, and, as has been already remarked, is converted by gentle calcination into the yellow oxide of bismuth.

Adulterations, Impurities, and Tests.—This preparation is seldom adulterated, and the mode of obtaining it will usually free it from any impurity the metal employed may contain. For tests, see the Text.

Incompatibles.—The alkalis and their carbonates and sulphurets; lime-water; Compound Solution of Iodide of Potassium.

Medicinal Uses.—Bismuthi Nitras is represented to possess antispasmodic powers, and to be especially serviceable in those forms of dyspepsia which are attended with painful contractions of the stomach. Dose, from gr. v. to ℈j.

PRÆPARATUM E CALCIO.

PREPARATION OF CALCIUM.

LIQUOR CALCIS.

Lime Water.

Aqua Calcis, P.L. 1721.
Aqua Calcis Simplex, P.L. 1746.
Aqua Calcis, P.L. 1788.
Liquor Calcis, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Lime half a pound;
Distilled Water twelve pints;

Pour upon the Lime, first slacked with a little of the Water, the remaining Water, and shake them together; then immediately cover the vessel, and set it by for three hours; afterwards keep the Solution with the remaining Lime in stopped glass vessels, and when it is to be used, take from the clear Solution.

Process.—This is a simple solution of lime in water. Unlike most other substances, lime is more soluble in cold water than in hot; and when lime-water which has been prepared with cold water is heated, small crystals of lime, probably containing water, are formed and deposited. I find that

A pint of water at	32° dissolves	13·25 grains	of Lime.
Ditto	60	11·6	ditto
Ditto	212	6·7	ditto

It is then evident that water at 32° takes up nearly one-seventh more lime than water at 60°, and almost double the quantity dissolved by boiling water.

Properties.—Lime-water is colourless and inodorous, but has a disagreeable alkaline taste. It turns vegetable blues green, and yellows brown, and it unites with oil by agitation, forming an imperfect soap. When lime-water is exposed to the atmosphere it absorbs carbonic acid, a thin crust of carbonate of lime being rapidly formed on the surface, and eventually the whole of the lime is precipitated from the solution; on this account lime-water should be preserved from the air as carefully as possible.

Incompatibles.—All acids and acidulous salts, alkaline carbonates, ammoniacal salts, metallic salts, borates, and astringent vegetable infusions.

Medicinal Uses.—It is antacid, and therefore useful in dyspepsia attended with acidity; it is also astringent in leucorrhœa, in the last stages of dysentery, and in protracted diarrhœa. Dose, with milk, f℥j. to f℥vj.

Remarks.—LIME is now transferred to Materia Medica. This earth, which exists in the mineral kingdom principally as carbonate of lime (limestone and chalk), occurs also in organized nature and in sea and river water combined with various acids, and is one of the most widely disseminated bodies of which the crust of the earth is composed. It also occurs in the non-metallic aërolites. It is obtained by exposing chalk, marble or limestone to a strong heat in kilns, which drives off the carbonic acid in the gaseous state; when these minerals are heated in closed vessels they fuse without losing their carbonic acid; air, aqueous vapour and the absence of pressure being essential to the expulsion of the carbonic acid. Lime is an oxide of the metal *Calcium*, which was first obtained by Davy through the agency of voltaic electricity. This metal has the colour and lustre of silver, and when heated in the air ignites, producing an intense white light, is oxidized and reconverted into lime.

Properties.—Pure lime is colourless, moderately hard, but easily reduced to powder; unlike the chalk or limestone from which it is procured, it is sonorous, although but slightly. When intensely heated, as in "Drummond's Light," by an ignited jet of oxygen and hydrogen, it is extremely luminous, emitting a dazzling white light. It is inodorous, has a burning, alkaline taste, and corrodes animal substances. Its specific gravity is 2·3. Vegetable blue colours are changed to green by lime, and by yellows to brown, evincing its alkaline properties. By exposure to the air it imbibes moisture and falls to powder, and is then gradually reconverted to the state of carbonate by combining with the carbonic acid of the atmosphere.

When a little water is poured upon lime it is rendered extremely hot, producing a temperature of at least 500°, sometimes accompanied with the evolution of light; it then swells, becomes powdery, and combining with a portion of the water is converted into hydrate of lime. Lime is slightly soluble in water, and the solution possesses alkaline properties. If lime be long exposed to atmospheric air it loses its property of slacking, owing to its having combined with water and carbonic acid, and it is then unfit for use.

Lime is a protoxide of Calcium, consisting of

One equivalent of Calcium......	20	or	71·43
One „ of Oxygen	8	„	28·57
Equivalent....	28.		100·

Formula...... CaO.

Its hydrate, *slacked lime,* may be obtained in small regular hexahedrons from solution in water. In both states it is combined with one equivalent of water.

A deutoxide of Calcium Ca O^2 exists.

For tests see MATERIA MEDICA: *Calx.* Oxalate of Ammonia gives a white precipitate with the slightest traces of lime in solution; its salts tinge the blowpipe flame of a dull red colour.

Pharmacopœia Preparations.—Liquor Calcis, Potassa cum Calce.

Pharmacopœia Uses.—Liquor Potassæ, Liquor Sodæ.

Calcii Chloridum, Calx Chlorinata and Creta Præparata, are now transferred to Materia Medica.

CHLORIDE OF CALCIUM is colourless, translucent, and inodorous; its taste is very bitter and pungent. By exposure to the air it deliquesces, and is of course very soluble in water; water at 60° dissolves nearly four times its weight, and hot water still more. By evaporation the solution yields crystals containing a large quantity of water. It is also very soluble in alcohol.

Composition.—This salt is composed of

One equivalent of Calcium	20	or	35·7
One „ of Chlorine............	36	„	64·3
Equivalent......	56.		100·

Formula...... $CaCl$.

Properties and Tests.—Slightly translucent; hard and friable; totally soluble in water: the solution gives no precipitate on the addition of ammonia or chloride of barium, nor when diluted with much water, with ferrocyanide of potassium.

Pharmacopœia Use.—Chloroformyl.

For Chloride of Lime see CHLOROFORMYL and LIQUOR SODÆ CHLORINATÆ.

PREPARED CHALK.—The mode of preparing the variety of carbonate of lime called chalk, is termed elutriation, and is an effectual method of reducing it to a fine powder.

Properties.—Chalk is a substance so well known, that it is hardly requisite to notice its qualities. When pure it is very nearly white. It is dull, opaque, soft, and light, and it always occurs massive. Its sp. gr. is about 2·3; it is sometimes of a greyish tint, and then contains an admixture of foreign matter. Carbonate of Lime is soluble in 10600 parts of cold, and 8834 parts of boiling water.

Composition.—By the analysis of Bucholz, chalk is composed of

Carbonic Acid	43
Lime	56·5
Water	·5
	100·

The water is an accidental admixture, and when perfectly pure, carbonate of lime is composed of

One equivalent of Carbonic Acid	22	or	44
One „ of Lime	28	„	56
Equivalent	50.		100·

Formula . . . . . CaO, CO^2.

Adulterations, Impurities, and Tests.—Chalk is so cheap an article that accidental admixture only can be suspected. If, however, what is termed *grey chalk* be used, the prepared chalk will contain some foreign matter, and the colour will be less perfect. See MATERIA MEDICA: *Creta Præparata.*

Incompatibles.—Chalk, or carbonate of lime, is incompatible with acids and acidulous salts, for they combine with its base and expel the carbonic acid in the state of gas.

Pharmacopœia Preparations.—Confectio Aromatica, Hydrargyrum cum Cretâ, Mistura Cretæ, Pulvis Cretæ Compositus, Unguentum Plumbi Compositum.

Medicinal Uses.—It is antacid and absorbent, and therefore it is useful in acidities of the primæ viæ, and in diarrhœa, after removing all irritating matters by previous evacuation. It is also a good application to ulcers discharging thin ichorous matter. Dose, gr. x. to gr. xl. or more.

PRÆPARATA E CUPRO.

PREPARATIONS OF COPPER.

Remarks.—Copper is a very important and widely disseminated metal; it exists native, sometimes in vast masses, and also crystallized in cubes and octohedrons, but its chief source in this kingdom is *copper pyrites*, a double sulphuret of iron and of this metal. Pure copper is of a peculiar red colour, and is susceptible of high polish. It has, when put into the mouth and breathed upon, a very disagreeable taste and smell; it is one of the most malleable and ductile of the metals. It fuses at about 2000°, it cannot be distilled, although it boils at high temperatures, giving off vapours which burn with a beautiful green flame. Its specific gravity when cast is 8·921, and when thoroughly hammered 8·952. It combines with most of the non-metallic elements, and forms alloys with all the common metals, excepting iron. The acids in general, excepting nitric acid, do not act upon copper unless by exposure to air at the same time, when the copper is oxidized and dissolved by the acid. Its equivalent is 32, and symbol or formula Cu. It combines with three proportions of oxygen, forming the suboxide or dinoxide, consisting of two eqs. of copper 64, and one eq. of oxygen 8=72, protoxide, and a peroxide of copper or *cupric acid*, which, according to Mr. Crum, appears to be a sesquioxide composed of two eqs. of copper 64, and three eqs. of oxygen 24=88. Protoxide, which is the salifiable oxide of copper, consists of

One equivalent of Copper	32	or	80
One „ of Oxygen	8	„	20
Equivalent......	40.		100.

Formula...... CuO.

Protoxide of Copper may be procured by roasting sheet copper, powdering the resulting "scale," and again roasting it in a muffle with free access of air, or by igniting the dried nitrate, subnitrate or carbonate of copper to redness. In this state it is a heavy black powder, insoluble in water, readily dissolved by acids, with which it forms salts of a blue or a green colour, and it communicates these tints to glass and to enamels. It combines with water, forming the beautiful blue gelatinous precipitate of hydrate of copper, produced in cold solutions of the salts of copper by the fixed alkalis and alkaline earths.

Of the salts of this oxide of copper the most important, and the only one inserted in the Pharmacopœia, is the Sulphate of Copper, for which see the third next preparation.

CUPRI AMMONIO-SULPHAS.

Ammonio-sulphate of Copper.

Cuprum Ammoniatum, P.L. 1809, P.L. 1824.
Cupri Ammonio-Sulphas, P.L. 1836.

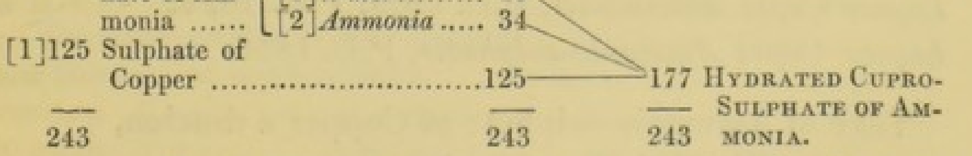
Take of Sulphate of Copper an ounce,
Sesquicarbonate of Ammonia an ounce and a half;

Rub them together until Carbonic Acid has ceased to evolve; then dry the Ammonio-sulphate of Copper, wrapped in bibulous paper, in the air.

Pulverulent, azure colour, is converted by a strong fire into oxide of copper, sesquicarbonate of ammonia being first, sulphate of ammonia being afterwards driven off. It is dissolved in water. This solution changes the colour of turmeric to brown, and arsenious acid being added, assumes a green colour.

Process.—When sulphate of copper is triturated with sesquicarbonate of ammonia, decomposition ensues, and carbonic acid is expelled in the state of gas from a portion of the ammoniacal carbonate; there appears to be formed cupro-sulphate of ammonia, which with the excess of the sesquicarbonate of ammonia employed, forms Cupri Ammonio-sulphas.

These reactions will be rendered clearer by the subjoined diagram:—



An excess of sesquicarbonate of ammonia is ordered in the formula of this process, to allow for waste by volatilization during the preparation and subsequent drying of this salt, which does not combine with all the water contained in the sesquicarbonate of ammonia and crystals of sulphate of copper.

Cupro-sulphate of Ammonia crystallizes in rhombic prisms of a rich azure colour, very soluble in water but insoluble in alcohol, and consisting of

One equivalent	of Oxide of Copper......		= 40	or	32·52
Two ,,	of Ammonia......	17×2	= 34	,,	27·63
One ,,	of Sulphuric Acid......		= 40	,,	32·53
One ,,	of Water..............		= 9	,,	7·32
	Equivalent......		123.		100·

Formula...... $CuO, 2NH^3, SO^3, HO$.

Properties.—Ammonio-sulphate of Copper, when it has not been too much dried, and retains some excess of sesquicarbonate of ammonia, is of a fine azure blue colour, has an ammoniacal smell, and a styptic metallic taste. It is liable to some variation, dependent upon its state of dryness, and the excess of the ammoniacal carbonate.

Impurities and Tests.—See Note in the Text.

Incompatibles.—This preparation is incompatible with acids; the alkalis potash and soda, and their carbonates, and with lime-water.

Pharmacopœia Preparation.—Liquor Cupri Ammonio-sulphatis.

Medicinal Uses.—It is tonic and antispasmodic. It has been employed in chorea, and also advantageously in epilepsy. Dose, *one quarter of a grain*, cautiously increased to *five grains*, twice a day. It is given in the form of pills, made up with crumb of bread.

LIQUOR CUPRI AMMONIO-SULPHATIS.

Solution of Ammonio-sulphate of Copper.

Aqua Sapphirina, P.L. 1721, P.L. 1746.
Aqua Cupri Ammoniati, P.L. 1788.
Liquor Cupri Ammoniati, P.L. 1809, P.L. 1824.
Liquor Cupri Ammonio-sulphatis, P.L. 1836.

Take of Ammonio-sulphate of Copper a drachm,
Distilled Water a pint;
Dissolve, and strain.

Properties.—This solution has a fine blue colour, but unless the ammonio-sulphate of copper retains some excess of sesquicarbonate of ammonia, I have found that it is decomposed, and one-half of the oxide of copper precipitated.

Medicinal Uses.—It is detergent and mildly escharotic. When still more largely diluted, it is employed in removing specks from the cornea.

CUPRI SULPHAS.

Sulphate of Copper.

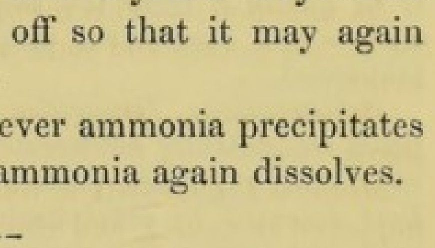
Take of Commercial Sulphate of Copper four pounds,
Distilled Water, boiling, four pints;

Pour the Water upon the Sulphate and apply heat, frequently stirring until it is dissolved. Strain the solution whilst still hot, and set aside that crystals may form. Evaporate the solution poured off so that it may again deposit crystals. Dry them all.

It is soluble in water. Whatever ammonia precipitates from this solution, an excess of ammonia again dissolves.

Remarks.—Sulphate of Copper is met with native, derived from the decomposition of the sulphuret of that metal by the action of air and water. It is found in commerce under the name of *Blue Vitriol* or *Roman Vitriol*, and is generally procured either by roasting copper pyrites, and then exposing it to the action of air and moisture in imitation of the natural process, and crystallizing out the sulphate of copper from the impure solution; or by directly dissolving oxide of copper, "copper scale," roasted, in dilute sulphuric acid, and crystallizing the solution. It occurs in beautiful large blue crystals, the primary form of which is a doubly-oblique rhombic prism, the cleavage of which is indistinct, parallel to the planes P, M, and T.

The annexed figure is a common modification of these crystals.



P on M...... 109° 32′
P „ T...... 127 40
M „ T...... 123 10

These crystals are of a beautiful blue colour, transparent when small, but seldom so when large, excepting at their edges; they are slightly efflorescent in a moderately dry atmosphere, and dissolve in about 3 parts of cold and 0·55 of boiling water, and are composed of

One equivalent of Oxide of Copper	40	or	32·06
One „ of Sulphuric Acid	40	„	32·06
Five „ of Water .... 9×5=	45	„	35·88
Equivalent......	125.		100·

Formula...... $CuO, SO^3, 5HO$.

When crystallized in a warm place, a solution of sulphate of copper sometimes affords green crystals containing but one equivalent of water; this salt is formed when the ordinary crystals are dried at 212°. Sulphate of copper has a most disagreeable metallic taste; its solution reddens litmus paper, and it forms numerous double and subsalts, the latter of which are all combinations of anhydrous sulphate of copper, with various but definite proportions of hydrated oxide of copper.

Process.—The object of recrystallizing the sulphate of copper is to purify it from the sulphates of iron, zinc, magnesia, &c., with which commercial sulphate of copper is frequently contaminated.

Adulterations, Impurities, and Tests.—Blue vitriol is sometimes fraudulently adulterated by crystallizing it with the abovementioned sulphates, particularly the sulphate of zinc. This is best detected by precipitating the copper with hydrosulphuric acid, and testing the clear solution with ammonia, which, when excess of hydrosulphuric acid exists in the solution, will yield a dirty white precipitate of sulphuret of zinc if that metal be present. The test of ammonia directed in the text will detect the presence of oxide of iron. The characteristic tests of copper are, the azure blue colour its salts give with excess of ammonia, black with hydrosulphuric acid, and red-brown with ferrocyanide of potassium.

Pharmacopœia Preparation.—Cupri Ammonio-sulphas.

Medicinal Uses.—Emetic. Dose, gr. viij. to gr. xv. It has also been used as a tonic and astringent like the Cupri Ammonio-sulphas, and in about the same dose. It is also used as a caustic.

PRÆPARATA E FERRO.

PREPARATIONS OF IRON.

Remarks.—Iron is the most widely disseminated of the metals proper. It occurs either as a constituent of, or accidentally in, almost every mineral formation, in water, and in organized bodies; whilst the larger portion of most aërolites consist of this metal in a malleable or *native* state. For the purposes of life this important metal is obtained from its oxides or carbonates, and in this country is first procured as *cast-iron*, which by a peculiar process of boiling the cast metal termed "puddling," is converted into wrought or *bar* iron, and this again, by absorbing minute quantities of carbon, is converted into steel. Wrought-iron, which is the purest form in which it occurs in commerce, is the description of iron employed in the Pharmacopœia.

Iron is of bluish-gray colour, and is usually fibrous in structure, but is also met with crystalline, when the colour is much whiter on the facets of the crystals; the primary form of these seems to be the cube. It possesses a weak but distinct smell and taste, and is fusible only by the greatest heat obtainable in a wind-furnace. Its specific gravity varies, being 7·788 at its maximum; it is malleable and is the hardest and toughest of the metals; it is capable of "welding" or joining together by pressure at a heat approaching to whiteness. It is readily attracted by the magnet, but loses this property at a bright red heat. Its equivalent is 28, which is represented by the symbol or formula Fe.

When heated with access of atmospheric air, or exposed to a damp atmosphere, it combines with oxygen, with which it forms the three following definite compounds:

$$\left.\begin{array}{llr}1 & \text{equivalent of Iron} \;.. & 28 \\ 1 & \quad ,, \quad \text{of Oxygen} & 8\end{array}\right\} = \text{Protoxide of Iron} \;..\; 36\ FeO.$$

$$\left.\begin{array}{llr}2 & \quad ,, \quad \text{of Iron} \;.. & 56 \\ 3 & \quad ,, \quad \text{of Oxygen} & 24\end{array}\right\} = \text{Sesquioxide of Iron } 80\ Fe^2O^3.$$

$$\left.\begin{array}{llr}1 & \quad ,, \quad \text{of Iron} \;.. & 28 \\ 3 & \quad ,, \quad \text{of Oxygen} & 24\end{array}\right\} = \text{Ferric Acid} \;......\; 52\ Fe\,O^3.$$

Of these the two first combine to form a definite compound, crystallizing in octohedrons, and consisting of an equivalent of each, which has been termed the black or magnetic oxide, and is composed of

$$\left.\begin{array}{ll}3 \text{ eqs. of Iron} \;.. & 28\times3=84 \\ 4 \;\; ,, \;\text{of Oxygen} & 8\times4=32\end{array}\right\} \text{Magnetic Oxide } 116\ FeO, Fe^2O^3.$$

Iron combines with several of the non-metallic elements and forms alloys with some of the metals. The characteristic tests of iron are best observed with the salts of the sesquioxide: these when very dilute give a voluminous red-brown flocculent precipitate with ammonia, a dark purple with tincture of galls, a rich blue with ferrocyanide, and a blood-red colour with sulphocyanide of potassium: the presence of organic matter often interferes with these reactions.

Protoxide of Iron forms numerous definite and frequently crystalline salts with the acids, which are, when free from any salt of the sesquioxide, of a very pale greenish-blue or beryl-colour; these are neutral to test-paper, and consist of one equivalent of base united to one equivalent of acid; their characteristic test is yielding a deep blue precipitate with the red prussiate of potash, ferridcyanide of potassium.

Sesquioxide of Iron, frequently termed Peroxide of Iron, forms far less stable and less easily crystallizable salts with the acids than the protoxide does; many of its salts have a reddish brown colour, and such as are soluble exert an acid reaction on litmus paper. Its characteristic tests have already been mentioned. The Ferri Sesquioxidum of the Pharmacopœia, when thoroughly washed with boiling water, dried and calcined, furnishes this oxide of iron in great purity.

Ferric Acid forms salts with the fixed alkalis; these are very soluble in water, and yield solutions of a deep amethystine colour, which are very liable to decomposition*. It forms with barytes a permanent and insoluble salt of a crimson-red colour.

Of these oxides the second is the only one inserted in the Pharmacopœia, although the salts of both that and the protoxide are introduced.

FERRI AMMONIO-CHLORIDUM.

Ammonio-chloride of Iron.

Flores Salis Ammoniaci Martiales, P.L. 1721.
Flores Martiales, P.L. 1746.
Ferrum Ammoniacale, P.L. 1788.
Ferrum Ammoniatum, P.L. 1809, P.L. 1824.
Ferri Ammonio-Chloridum, P.L. 1836.

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* Ferrate of Potash crystallizes in brilliant garnet-black hexagonal prisms.—Ed.

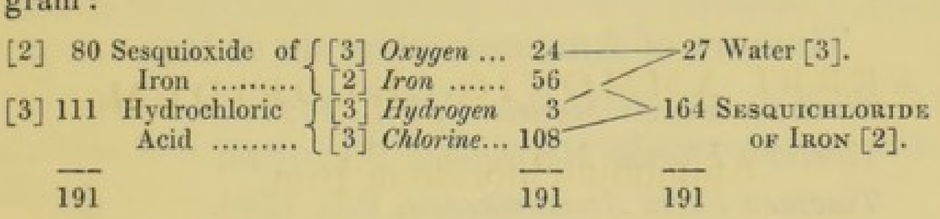
Take of Sesquioxide of Iron three ounces,
Hydrochloric Acid half a pint,
Hydrochlorate of Ammonia two pounds and a half,
Distilled Water three pints;

Mix the Sesquioxide with the Acid, and digest in a sand-bath, stirring frequently until it is dissolved; afterwards add the Hydrochlorate, first dissolved in the Water; strain and evaporate the liquor until the salt is dried. Rub this to powder.

Pulverulent, orange-coloured, is dissolved in proof spirit and in water. Potash being added to either solution evolves ammonia, and from 100 grains of this salt precipitates about 7 grains of sesquioxide of iron.

Remarks.—Until the Pharmacopœia of 1836, this preparation was ordered to be sublimed; the present process yields a preparation uniform both in strength and appearance.

Process.—When two eqs. of sesquioxide of iron 80, consisting of two eqs. *iron* 56 and three eqs. of *oxygen* 24, are acted upon by three eqs. of hydrochloric acid 111, composed of three eqs. of *chlorine* 108, and three eqs. of *hydrogen* 3, they undergo mutual decomposition and interchange of their elements; the two eqs. of iron 56, unite with the three eqs. of chlorine 108, and form 164 or two eqs. of SESQUICHLORIDE OF IRON; whilst the three eqs. of oxygen 24, combining with the three eqs. of hydrogen 3, form 27 or three eqs. of water, as in the subjoined diagram:



The sesquichloride of iron thus obtained is mixed with the ammoniacal salt and evaporated to dryness, forming a mixture rather than a definite compound, consisting very nearly of

Sesquichloride of Iron	15
Hydrochlorate of Ammonia......	85
	100.

and yielding, as stated in the text, about 7 per cent. of sesquioxide of iron when decomposed by an alkali.

Properties.—The colour of this preparation is an orange red; it becomes moist when exposed to the air, is readily dissolved by water, and is, partially at least, soluble in alcohol. It has a sharp saline and metallic taste, but no smell.

When mixed solutions of sesquichloride of iron and hydrochlorate of ammonia are crystallized, they yield red cubic crystals of a definite double salt, consisting according to Mitscherlich of

Two eqs. of Sesquichloride of Iron....	82×2=164	or	56·55
Two „ of Hydrochlorate of Ammonia	54×2=108	„	37·24
Two „ of Water	9×2= 18	„	6·21
Equivalent........	290.		100·

Formula..... $Fe^2 Cl^3, 2NH^3 HCl, 2HO$.

It is this salt which, mixed with hydrochlorate of ammonia, exists in this preparation.

Impurities and Tests.—See Note in the text: it is not likely to be adulterated. If carelessly prepared, it will probably yield less than 7 grs. of sesquioxide of iron from 100 grs. of the salt.

Incompatibles.—This preparation is decomposed by the alkalis and their carbonates, sesquioxide of iron being precipitated, and ammonia evolved; lime-water produces a similar effect; and, like other preparations of iron, it is rendered black by astringent vegetable infusions.

Pharmacopœia Preparation.—Tinctura Ferri Ammonio-chloridi.

Medicinal Uses.—It is stated to be tonic, emmenagogue, and aperient. Its dose may be estimated by what I have mentioned respecting its composition.

TINCTURA FERRI AMMONIO-CHLORIDI.

Tincture of Ammonio-chloride of Iron.

Tinctura Martis Mynsichti, P.L. 1721.
Tinctura Florum Martialium, P.L. 1746.
Tinctura Ferri Ammoniacalis, P.L. 1788.
Tinctura Ferri Ammoniati, P.L. 1809, P.L. 1824.
Tinctura Ferri Ammonio-chloridi, P.L. 1836.

Take of Ammonio-chloride of Iron four ounces,
Proof Spirit,
Distilled Water, each half a pint*;

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* I am authorized by the compilers of the Pharmacopœia to state that the word "dimidium" was accidentally omitted after "octarium" in the formula for "Tinctura Ferri Ammonio-chloridum."—Ed.

Dissolve, and strain.

A fluidounce, potash being added, precipitates 5·8 grs. of sesquioxide of iron*.

Remarks.—This preparation does not appear to possess any advantage over the Tinctura Ferri Sesquichloridi, from which it differs chiefly in containing hydrochlorate of ammonia.

TINCTURA FERRI SESQUICHLORIDI.

Tincture of Sesquichloride of Iron.

Tinctura Martis cum Spiritu Salis, P.L. 1721.
Tinctura Martis in Spiritu Salis, P.L. 1746.
Tinctura Ferri Muriati, P.L. 1788.
Tinctura Ferri Muriatis, P.L. 1809, P.L. 1824.
Tinctura Ferri Sesquichloridi, P.L. 1836.

Take of Sesquioxide of Iron six ounces,
Hydrochloric Acid a pint,
Rectified Spirit three pints;

Mix the Sesquioxide with the Acid, and digest in a sand-bath, frequently stirring, until it is dissolved. Then add the spirit to the cold solution, and strain.

Its specific gravity is ·992. A fluidounce of it, by the addition of potash, precipitates nearly 30 grs. of sesquioxide of iron.

Remarks.—It has been already explained, that when sesquioxide of iron is dissolved in hydrochloric acid, the resulting compound is sesquichloride of iron. See FERRI AMMONIO-CHLORIDUM.

Properties.—This tincture is of a reddish-brown colour, and is essentially composed of sesquichloride of iron. Its taste is acid

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* Instead of "5·8 grains of sesquioxide of iron" it probably should be "6·8 grains;" this preparation when properly made being perfectly soluble in the weak spirit.—ED.

and extremely styptic, and its smell resembles that of hydrochloric ether. Sesquichloride of iron consists of

Two equivalents of Iron	...... $28 \times 2 =$	56	or 34·15
Three " of Chlorine	.... $36 \times 3 =$	108	" 65·85
Equivalent	....	164.	100·

Formula...... $Fe^2\,Cl^3$.

It may be obtained in the form of brilliant and iridescent red-brown crystals, by subliming calcined sulphate of iron mixed with an equal weight of chloride of calcium. This salt combines with water in two proportions, forming definite hydrates; the first occurs in tabular crystals, containing five eqs. of water $Fe^2\,Cl^3$, 5HO, the second crystallizes in acicular prisms, and contains twelve eqs. of water $Fe^2\,Cl^3$, 12HO.

Incompatibles.—Alkalis and their carbonates, lime-water, carbonate of lime; magnesia, and its carbonate. This tincture is rendered black by astringent vegetable bodies, and is decomposed by a solution of gum-arabic.

Medicinal Uses.—When made with proper care it is one of the most certain and active preparations of iron; and it remains for a very long time without suffering any variation of strength from decomposition. Dose, ♏x. to f℥j.

It is stated to be particularly useful as a tonic in scrofula: in dysuria, ♏x. given every ten minutes until some sensible effect is produced, afford speedy relief; and it is a powerful styptic in hæmorrhage from the bladder, kidneys, or uterus. It is used externally as a styptic in cancerous and fungous sores, and for the purpose of destroying venereal warts.

SYRUPUS FERRI IODIDUM.

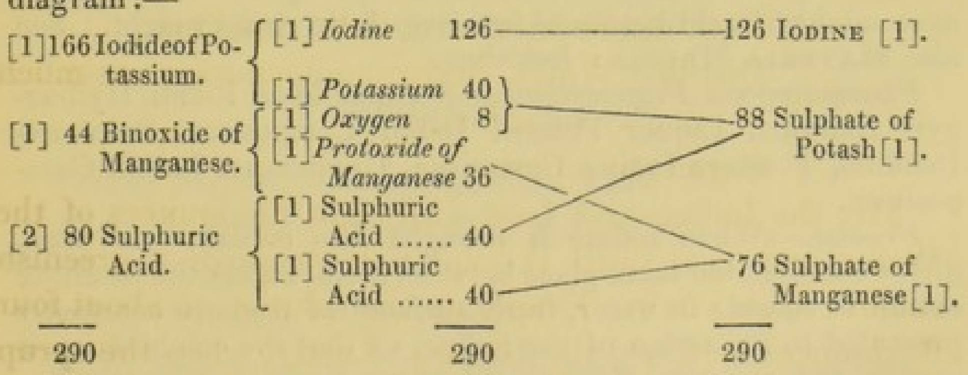
Syrup of Iodide of Iron.

Take of Iodine an ounce,
Iron, drawn into wire, three drachms,
Distilled Water, twelve fluidounces, or as much as may be sufficient,
Sugar ten ounces;

Mix the Iodine and Iron with eight fluidounces of the Water, and heat until the solution acquires a greenish colour; then strain. Evaporate the solution to about four fluidounces, and add the Sugar. Lastly, when the syrup has cooled, add as much water as may be required to fill a measure of fifteen ounces; and keep it in a well-stoppered black glass vessel.

Remarks.—Iodine is a non-metallic elementary solid body, which was discovered in 1812 by M. Courtois of Paris. Its peculiar properties were first minutely pointed out by Gay-Lussac and Davy. It exists in sea-water, probably combined with potassium, in marine molluscous animals, some fish-oils, and most sea-weeds. It has been found in the mineral kingdom in coal and fossil fuci, and combined with silver, lead, and mercury. It exists in sea-water, and in several mineral springs, and is stated to occur in a variety of Agave, in some beet-roots, in *Nasturtium aquaticum*, &c.; and if any reliance can be placed on some statements made by M. Chatin, this element is as widely disseminated as the researches of Fownes and others have proved Fluorine to be. Iodine is principally obtained from *kelp*, which is sea-weed that has been burnt for the purpose of obtaining alkaline salts. The residuary kelp-liquor, after getting rid of the impurities which would interfere with the iodine, is heated with sulphuric acid and binoxide of manganese; by this process, and owing to decompositions analogous to those which evolve chlorine from chloride of sodium, iodine is obtained from the iodide of potassium contained in the kelp-liquor.

In the preparation of Iodine one equivalent of Iodide of Potassium 166, consisting of one eq. of *iodine* 126, and one eq. of *potassium* 40, is acted on by one equivalent of Binoxide of manganese 44, composed of one eq. of *manganese* 28, and two eqs. of *oxygen* 16, mixed with two eqs. of Sulphuric Acid 80. One eq. of the sulphuric acid 40, acts upon the one eq. of binoxide of manganese, forming one eq. of protosulphate of manganese 76, and one eq. of *nascent* oxygen 8; this nascent oxygen combines with the one eq. of potassium 40, producing 48 or one eq. of potash, which unites with the remaining eq. of sulphuric acid 40, forming 88 or one eq. of sulphate of potash; whilst the one eq. of IODINE 126, thus set free, rises in vapour and condenses in the receivers, either in black micaceous scales, or in striated metalline lumps, much resembling in appearance tersulphuret of antimony. This decomposition is illustrated by the following diagram:—



Iodine is also obtained through the intermediate action of a subsalt of copper, the diniodide, which is precipitated when a mixture of sulphate of copper and protosulphate of iron is added to the mother-liquor of the kelp.

Properties.—Iodine is a soft opaque solid of a bluish-black colour and metallic lustre. It crystallizes in flat micaceous scales, the primary form of which is a right rhombic prism. Its specific gravity, according to Gay-Lussac, is 4·948. In vapour its sp. gr. is to that of air as 8·738 to 1. When moderately heated it is vaporized, yielding a rich violet-coloured vapour; it melts at 220° and boils at about 350°. When the heat by which it was vaporized is withdrawn, it again assumes the form of brilliant crystals, unchanged in properties; nor is it decomposed or altered at high temperatures. It evaporates more readily when damp than when dry. Iodine has a strong disagreeable smell and taste, resembling those of chlorine and bromine, and it stains the skin, though not permanently, of a brownish colour. It requires nearly 7000 times its weight of water for solution, but is readily soluble in alcohol; the solution is of a reddish-brown colour. It forms definite and permanent compounds with most of the other elements, and possesses bleaching properties. It is very poisonous. It unites readily with metals, forming compounds which are termed *iodides*; it forms various compounds with oxygen, and combines with hydrogen, forming hydriodic acid gas; it is incombustible, but its vapour is a supporter of combustion.

Adulterations, Impurities, and Tests.—The aqueous solutions of the iodides give a straw-coloured precipitate with nitrate of silver, a full rich yellow with the salts of lead, and dazzling scarlet-coloured precipitates with the persalts of mercury. The characteristic tests of free iodine are the violet vapour which it yields, and the intense blue colour it produces in a solution of starch. The Iodine met with in commerce is at times largely adulterated; iron, sand, charcoal, plumbago, sulphuret of antimony, oxide of manganese, chloride of calcium, have all been used as sophisticants of this substance; exposure to heat, however, will detect them all. Its impurities are usually moisture and traces of iron and lead, and sometimes cyanogen. When placed over sulphuric acid it should lose very little or no weight. See also MATERIA MEDICA: *Iodinium.*

Pharmacopœia Preparations.—Syrupus Ferri Iodidi, Hydrargyri Iodidum, Liquor Potassii Iodidi Compositus, Sulphuris Iodidum, Tinctura Iodinii Composita, Unguentum Iodinii Compositum.

Process.—When Iodine is brought into contact with iron, direct combination takes place between them; and as the resulting iodide is soluble in water, fresh surfaces of iron are constantly presented to the action of the iodine, so that the combination is readily and quickly effected; the sugar exerts a protective influence upon a solution of this salt, delaying and greatly preventing the oxidation to which it, especially if water be present, is subject, sesquioxide of iron being formed and iodine liberated probably with the formation of some hydriodic acid. Iron wire, or a strip of bright iron, immersed in a solution of this salt, also tends to prevent its decomposition.

Properties.—The solution obtained is one of Iodide or Protiodide of Iron; it is of a green colour, and by evaporation with as little contact of air as possible, green tabular crystals may be formed. By evaporation to dryness and heating moderately, this salt is fused, and on cooling becomes an opaque crystalline mass of an iron-grey colour and metallic lustre. When exposed to the air it attracts moisture, and is very soluble both in water and in alcohol.

Composition.—Crystallized Iodide of Iron is composed of

One equivalent of Iodine		126	or 63·3
One „ of Iron		28	„ 14·
Five „ of Water	9×5=	45	„ 22·7
Equivalent		199.	100·

Formula...... $Fe\,I, 5HO$.

There is no other iodide of iron than the one just described.

Impurities and Tests.—Iodide of Iron is not likely to be adulterated, but it easily decomposes and thus becomes impure. It should be when solid of a grey metallic appearance, yielding a green solution with water, with very little or no insoluble residue.

Incompatibles.—The solution is decomposed by ammonia, potash, soda and their carbonates, by lime-water, and all other substances with which sulphate of iron is incompatible.

Medicinal Use.—Employed as an emmenagogue, from ♏x. to ♏xxx. at a dose. This syrup contains, if the Iodine employed be dry and pure, about 4·9 grs. of anhydrous iodide of iron in a fluidrachm equal to about one grain in ♏xij.

FERRI SESQUIOXIDUM.

Sesquioxide of Iron.

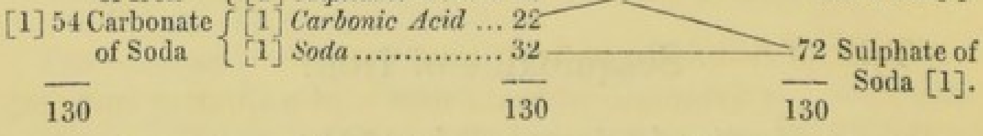
Crocus Martis Astringens, P.L. 1721.
Chalybis Rubigo Præparata, P.L. 1746.
Ferri Rubigo, P.L. 1788.
Ferri Carbonas, P.L. 1809.
Ferri Subcarbonas, P.L. 1809, edit. alt., P.L. 1824.
Ferri Sesquioxydum, P.L. 1836.

Take of Sulphate of Iron four pounds,
Carbonate of Soda four pounds and two ounces,
Water, boiling, six gallons;

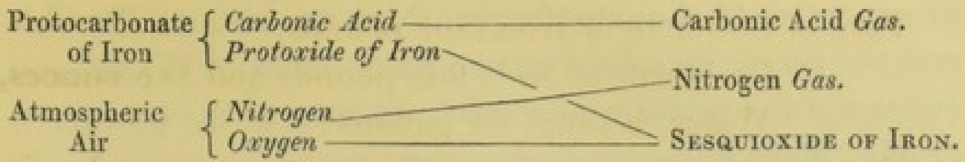
Dissolve the Sulphate and Carbonate separately, in three gallons of Water. Mix the liquors together whilst hot, and set them by, that the precipitate may subside. The supernatant liquor being poured off, wash this frequently with water, and dry it.

It is dissolved in hydrochloric acid, scarcely effervescing; and is thrown down from it by potash. The strained solution is then free from colour, and is not coloured by adding hydrosulphuric acid nor ferrocyanide of potassium.

Process.—In accordance with the arrangement of this work, the nature and properties of Sulphate of Iron, and of Carbonate of Soda, will be considered under their respective heads. In this case it will be convenient to regard these salts as anhydrous, their water of crystallization playing no part in the process. An equivalent of protosulphate of iron 76, is composed of one eq. of *protoxide of iron* 36, and one eq. of *sulphuric acid* 40, and an equivalent of carbonate of soda 54, consists of one eq. of *soda* 32, and one eq. of *carbonic acid* 22. When solutions of these salts are mixed double decomposition ensues, the one eq. of protoxide of iron 36, combines with the one eq. of carbonic acid 22, forming one eq. of protocarbonate of iron 58, which being combined with water, forms a greenish white precipitate; whilst the one eq. of sulphuric acid 40, unites with the one eq. of soda 32, to form one eq. of sulphate of soda 72, which remains in solution. The subjoined diagram will further illustrate this decomposition:—



The formation of the carbonate or protocarbonate of iron is the first step in the process; during the washing which is necessary to get rid of the sulphate of soda, and especially by the subsequent exposure to the air whilst drying, the protoxide of iron loses its carbonic acid, acquires half an equivalent of oxygen, and thus becomes sesquioxide of iron.



This compound, however, generally contains a small quantity of carbonic acid; it is prepared nearly in the same mode as what was called *Subcarbonate of Iron* in the Pharmacopœias of 1809 and 1824, which usually was, what it is now termed, merely sesquioxide of iron.

Properties.—This preparation is of a reddish-orange or brown colour; it is inodorous and has a disagreeable taste; is insoluble in water, and is not readily dissolved by any acid excepting the hydrochloric acid.

Composition and Formula have been already given.

Adulterations, Impurities, and Tests.—See Note in the text. It is not often adulterated, excepting by calcined sulphate of iron or *colcothar*, which is heavy, has no orange tint with the red, is often gritty to the touch, and is both tasteless and useless; but it is frequently badly prepared and imperfectly washed, containing much sulphate of soda. Treated with distilled water, the filtered solution should not produce a dense and voluminous precipitate with a salt of lead or barytes. For medicinal purposes a mere trace of sulphate of soda is quite unobjectionable.

Pharmacopœia Preparations.—Emplastrum Ferri, Ferri Ammonio-chloridum, Tinctura Ferri Sesquichloridi.

Medicinal Uses.—Tonic and emmenagogue. Dose, from gr. v. to xxx. combined with myrrh or aromatics. In doses of half a drachm to a drachm, two or three times a day, it has proved efficacious in tic douloureux. Dr. Elliotson states that in doses of ʒj. to ʒiv. every six hours he has employed it successfully in chorea.

FERRI CARBONAS CUM SACCHARO.

Carbonate of Iron with Sugar.

Take of Sulphate of Iron four ounces,
Carbonate of Soda four and a quarter ounces,
Sugar two ounces,
Distilled Water, boiling, four pints;

Dissolve the Sulphate and Carbonate separately in two pints of Water. Mix the solutions together whilst still hot, and set aside that the Carbonate of Iron may subside. Then, the supernatant solution being poured off, wash the precipitated Carbonate frequently with water. To this add the Sugar dissolved in two fluidounces of Water, and evaporate the mixture in a water-bath until the powder is dried. Keep it in a well-stoppered vessel.

Remarks.—This is one of the new preparations of the present Pharmacopœia; as in the case of Syrupus Ferri Iodidi, the sugar here exerts a protective influence and in great measure prevents the decomposition of the carbonate of the protoxide of iron and the higher oxidation which takes place in the preceding preparation; consequently this is a far more active medicament than the sesquioxide of iron. It is a greyish-green powder possessing a sweetish styptic taste, readily dissolving in hydrochloric acid with effervescence. The final drying heat should be kept low, not exceeding 130°.

Incompatibles.—Acids, acidulous salts, and all astringent decoctions and infusions.

Medicinal Uses.—As a tonic and chalybeate. Dose, gr. iij. to gr. xx. in pills, or as an electuary mixed with syrup or confection of Rose.

FERRI AMMONIO-CITRAS.

Ammonio-citrate of Iron.

Take of Sulphate of Iron twelve ounces,
Carbonate of Soda twelve and a half ounces,
Citric Acid six ounces,
Solution of Ammonia nine fluidounces,
Distilled Water, boiling, twelve pints;

Separately dissolve the Sulphate and Carbonate in six pints of Water. Mix the solutions whilst hot and set aside that the precipitate may subside. The supernatant solution being poured off, wash this frequently with water and dissolve it, the Acid being added, with the assistance of heat. Then the Ammonia being mixed with it when cold, evaporate the solution to the consistence of a syrup. Dry this very thinly spread upon flat earthenware plates with a gentle heat. It is to be kept in a well-stoppered vessel.

It is dissolved by water. This solution does not change the colour of litmus nor turmeric; nor on the addition of ferrocyanide of potassium does it become blue*; but potash or solution of lime being added, sesquioxide of iron is precipitated and ammonia evolved. From 100 grains dissolved in water, potash being added, about 34 grains of sesquioxide of iron are precipitated.

Remarks.—This preparation is now inserted in the Pharmacopœia. The first stage of the process is a repetition of the first portions of the two preceding preparations, the hydrated carbonate of iron being subsequently converted into a citrate of iron, the excess of acid being neutralized by ammonia and the protoxide of iron converted into sesquioxide by exposure to the atmosphere.

Properties.—This salt does not crystallize, but when properly prepared, occurs in brilliant translucent scales of a garnet-red colour, readily soluble in water and of a slightly ferruginous taste. It varies slightly in composition, and appears to be a mixture of citrate of iron with citrate of ammonia. For Citric Acid see LIQUOR AMMONIÆ CITRATIS.

Incompatibles.—The mineral acids; potash, soda, lime-water, and all preparations containing tannic acid.

Medicinal Uses.—See FERRI POTASSIO-TARTRAS. Dose, gr. v. to gr. x. dissolved in Water flavoured with Syrup of Orange.

FERRI SULPHAS.

Sulphate of Iron.

Sal seu *Vitriolum Martis,* P.L. 1721.
Sal Martis, P.L. 1746.
Ferrum Vitriolatum, P.L. 1788.
Ferri Sulphas, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Commercial Sulphate of Iron four pounds,
Sulphuric Acid a fluidounce,
Iron, drawn into wire, an ounce,
Distilled Water four pints;

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* A precipitate of Prussian blue is not produced, but the solution often assumes a bluish-green tint.—ED.

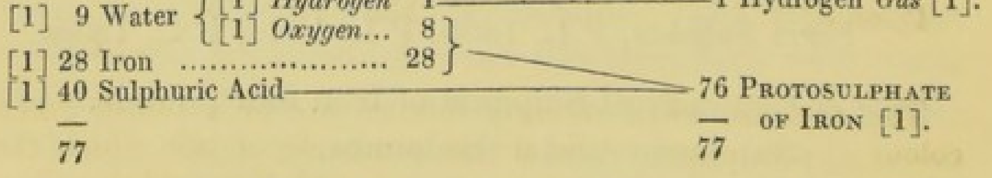
Mix the Acid with the Water; add to these the Sulphate and the Iron; then apply heat, stirring frequently, until the sulphate is dissolved. Strain the solution whilst hot, and set aside to crystallize. Evaporate the solution which is poured off that it may again deposit crystals. Dry them.

Bluish green. Is dissolved by Water.

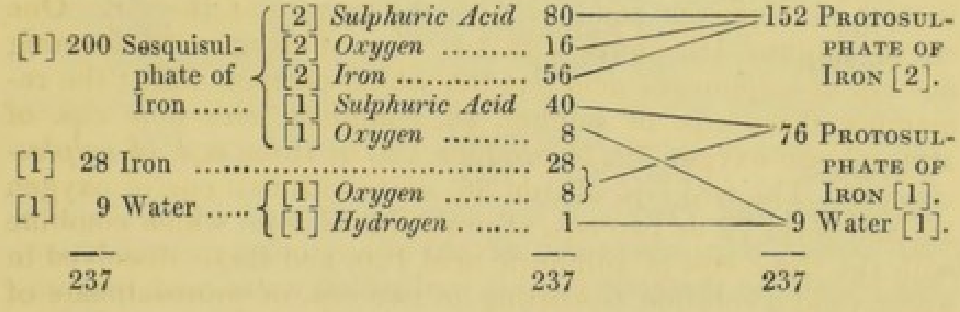
Remarks.—Commercial SULPHATE OF IRON, commonly called *copperas* or *green vitriol*, occurs native, but is prepared for various purposes by exposing bisulphuret of iron, *iron pyrites*, to the action of air and moisture, by which it is oxidized in the following manner; the moisture simply facilitating the action may conveniently be disregarded. Two equivalents of bisulphuret of iron 120, consist of four eqs. of *sulphur* 64, and two eqs. of *iron* 56; both these elements combine with the oxygen of the air. One eq. of sulphur 16, unites with two eqs. of oxygen 16, forming one eq. of sulphurous acid gas 32, which escapes, whilst the remaining three eqs. of sulphur 48, combines with nine eqs. of atmospheric oxygen 72, to produce 120 or three eqs. of *sulphuric acid*. The two eqs. of iron 56, unite with two eqs. of oxygen 16, and form 72 or two eqs. of protoxide of iron, which combine with the three eqs. of sulphuric acid 120, and these dissolved in water yield a solution consisting of two eqs. of protosulphate of iron 152, and one eq. of sulphuric acid 40; this is saturated by boiling the solution with metallic iron, which is oxidized at the expense of the water, hydrogen being evolved; and this solution when crystallized yields commercial SULPHATE OF IRON or green vitriol.

$$
{[2]}\ 120\ \text{Bisulphuret of Iron}\left\{\begin{array}{lcl}
{[1]}\ \textit{Sulphur}\ 16+{[2]}\ \text{Oxygen}\ 16 & = & \left\{\begin{array}{c}32\ \text{Sulphurous Acid}\\ \textit{Gas}\ {[1]}.\end{array}\right. \\
{[1]}\ \textit{Sulphur}\ 16+{[3]}\ \text{Oxygen}\ 24 & = & 40\ \text{Sulphuric Acid}\ {[1]}. \\
\left.\begin{array}{l}{[2]}\ \textit{Sulphur}\ 32+{[6]}\ \text{Oxygen}\ 48\\ {[2]}\ \textit{Iron}\ \ldots\ 56+{[2]}\ \text{Oxygen}\ 16\end{array}\right\} & = & \begin{array}{c}152\ \text{PROTOSULPHATE}\\ \text{OF IRON}\ {[2]}.\end{array}
\end{array}\right.
$$

And again,

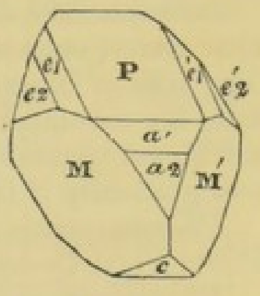


Process.—In the last Pharmacopœia, the process illustrated by the latter diagram was the method directed for obtaining sulphate of iron; in the present the impure salt of commerce is advantageously made use of: the sulphuric acid and iron wire being employed to reduce any sesquisulphate of iron, the commercial salt may contain, to the state of protosulphate by the action of the *nascent* hydrogen, a term employed to denote a gas immediately before it assumes the aëriform state when it possesses peculiar properties, by partially deoxidizing the sesquisulphate and the consequent formation of a protoxide of iron which combines with the sulphuric acid in excess; water being decomposed as in the second diagram. The metallic iron also precipitates any traces of copper which the commercial sulphate may contain. In the subjoined diagram, which will illustrate the process of the Pharmacopœia for the deoxidation of the sesquisalt, the hydrogen is converted into water, instead of being evolved in the gaseous state; the sulphuric acid is omitted, that not being absolutely requisite, being employed simply to facilitate this operation, affording by its action on the water and iron a rapid and abundant supply of hydrogen, a portion of which in practice, being in excess, is evolved in the gaseous state.



When a solution of sulphate of iron of the proper degree of concentration is obtained it readily deposits crystals on cooling, the primary form of which is an *oblique* rhombic prism, MM′ and P of the annexed figure being the primary planes; the crystals sometimes exhibit the secondary planes *a* and *e* much developed.

P on M, or M′	99°	20′
M on M′	82	20
P on e_1	153	00
P on e_2	123	55
P on a_1	159	00
P on a_2	136	10



The crystals, when recently formed, are of a bluish green colour; by exposure to the air the protoxide of iron which the salt contains gradually attracts oxygen, and the reddish yellow colour of the sesquisalt of iron formed, renders the crystals green by admixture with the bluish protosulphate. When the exposure has been long continued, the surface of the crystals, especially if moist, is incrusted with subsulphate of sesquioxide of iron, and they ought then to be rejected; the aqueous solution still more readily attracts oxygen, and it is rendered first green and then reddish yellow, depositing at the same time subsulphate of sesquioxide of iron.

Sulphate of iron has a disagreeable styptic taste; it is insoluble in alcohol; 100 parts are dissolved by 143 parts of water at 60°, and by 30 at 212°. The solution when free from sesquioxide of iron is perfectly neutral, is not altered by gallic acid or astringent vegetable preparations, and yields a white precipitate with ferrocyanide of potassium, which by absorbing oxygen from the air becomes rapidly blue, forming Prussian blue.

Composition.—Crystallized sulphate of iron contains 7 eqs. of water, of which it loses 6 eqs. at 238°, becoming white and pulverulent; the remaining eq. of water is expelled at about 535°. When deprived of most of its water and distilled it yields the peculiar sulphuric acid already noticed, see ACIDUM SULPHURICUM DILUTUM, and sesquioxide of iron; it consists of

One equivalent of Protoxide of Iron	36.	25·9
One " of Sulphuric Acid	40.	28·8
Seven " of Water	63.	45·3
Equivalent	139.	100·

Formula...... $FeO, SO^3, 7HO$.

Impurities and Tests.—When pure the crystals are of a bluish green colour, transparent and devoid of any ochrey incrustation. They should be perfectly soluble in distilled water, and iron immersed into the solution should not precipitate any copper. When quite free from sesquioxide, which is however scarcely to be expected, ferrocyanide of potassium gives a white precipitate, which is tinged with blue in proportion to the quantity of sesquioxide and consequently of impurity present. No colour should be produced on the addition of gallic acid.

Incompatibles.—Ammonia, potash, soda, and their carbonates, lime-water, chloride of calcium, the acetates of lead, and soaps. The salts of barytes and strontia, as well as the earths they contain, are incompatible with this salt. It is decomposed also by astringent vegetable bodies, immediately if it contain sesquioxide, and gradually if free from it, by exposure to the air.

Pharmacopœia Preparations.—Mistura Ferri Composita, and Pilula Ferri Composita.

Pharmacopœia Uses.—Ferri Sesquioxidum, Ferri Carbonas cum Saccharo, Ferri Ammonio-Citras, Ferri Potassio-Tartras.

Medicinal Uses.—Tonic, astringent, emmenagogue, and anthelminthic; in large doses it occasions griping in the bowels. Dose, gr.j. to v. or more, made into pills with extract of gentian. It should never be given in solution without previously boiling the water, to free it from atmospheric air, the oxygen of which is readily absorbed, and the sulphate of iron, being decomposed by it, is rendered much less efficacious.

FERRI POTASSIO-TARTRAS.

Potassio-tartrate of Iron.

Ferrum Tartarizatum, P.L. 1788, P.L. 1809, P.L. 1824.
Ferri Potassio-Tartras, P.L. 1836.

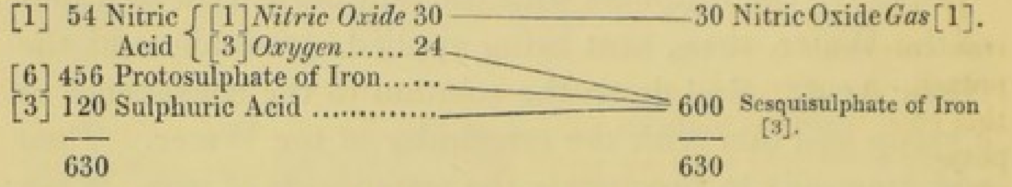
Take of Sulphate of Iron four ounces,
Sulphuric Acid half a fluidounce,
Nitric Acid a fluidounce,
Solution of Ammonia ten fluidounces,
Bitartrate of Potash, powdered, two ounces,
Distilled Water four gallons;

Dissolve the Sulphate with the Sulphuric Acid in a pint of the Water, then, heat being applied, gradually add the Nitric Acid. Boil down the solution to the consistence of a syrup and mix with the remainder of the Water. Then add Ammonia to precipitate the sesquioxide of iron. Wash this and set aside for twenty-four hours. Then heat the Bitartrate mixed with half a pint of distilled water to 140°, and to it gradually add the moist sesquioxide from which the supernatant water has been poured off. Separate by a linen cloth that portion of this sesquioxide which cannot be dissolved: then evaporate the clear solution till the salt is dried. Potassio-Tartrate of Iron may be dried in the same way as AMMONIO-CITRATE OF IRON.

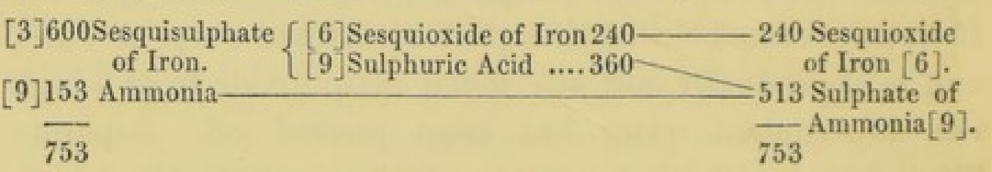
It is dissolved in water. Neither the colour of litmus nor of turmeric is changed by this solution; nor ferrocyanide of potassium being added, is a blue colour produced; nor is aught thrown down by the addition of any alkali. If it be heated with potash it precipitates about 34 grains of sesquioxide of iron from 100 grains.

Remarks.—In the present process the mode of obtaining the hydrate of sesquioxide of iron is altered from the last, and for the better; for when, as in the process of the last Pharmacopœia, this hydrate is precipitated from a sesquisalt of iron by potash, a portion of that alkali obstinately adheres to the precipitate, which cannot be completely freed from it even by careful and repeated washings, and this combining with a portion of the tartaric acid of the bitartrate, diminishes its solvent power as respects the oxide of iron, and consequently the strength of the preparation.

Process.—It has already been shown that when nitric acid acts upon most metals and some elementary bodies it is converted into oxygen and nitric oxide, the base being oxidized at its expense; precisely the same effect is produced in the above process, when it converts the protoxide of iron into sesquioxide, which dissolves in the additional sulphuric acid and forms a solution of sesquisulphate of iron, which on the addition of ammonia is decomposed into hydrated sesquioxide of iron, and sulphate of ammonia. It is unnecessary to repeat the verbal descriptions of these decompositions, which will be sufficiently explained by the following diagrams, merely premising that it is necessary to employ six equivalents of sulphate of iron, that being the quantity of this salt peroxidized by one eq. of Nitric Acid.



which requires 9 eqs. of Ammonia to decompose it.



When this hydrated sesquioxide of iron is boiled in water with the bitartrate of potash, the excess of acid which this salt contains dissolves the oxide, and a solution is obtained, which consists of tartrate of potash and tartrate of sesquioxide of iron, and this evaporated to dryness constitutes the POTASSIO-TARTRATE OF IRON.

Properties.—This preparation is of a brownish colour; it is inodorous, and has but little of the disagreeable taste of the iron, when properly prepared. It is readily soluble in water, and becomes moist in a damp atmosphere. It gives a dark-coloured precipitate with astringent vegetables, but does not afford a blue precipitate with ferrocyanide of potassium; neither potash, soda, nor their carbonates, decompose this solution unless heat be applied, and even then ammonia and its carbonate produce no effect upon it. Of the chalybeate preparations, this, and the ammonio-citrate of iron are the least nauseous, and the solution will remain for a considerable time without suffering decomposition.

This preparation, for the reason assigned in the foregoing remarks, and also from the absence of any tartrate of ammonia which the salt of the last Pharmacopœia contained, is nearly twice the strength of the former salt, which contained but 18 per cent. of sesquioxide of iron instead of 34. Its composition has not yet been accurately determined; but if, as is probably the case, we regard 3·2 grs. of the sesquioxide of iron yielded by 100 grs. of the salt as due partly to a little oxide remaining in suspension and not separated by the linen cloth ordered to be employed, and partly to adherent potash, as is always the case when this alkali is used as a precipitant of the oxide of iron, the composition of this salt will agree with that assigned to it by Soubeiran, viz.

One eq. of Tartrate of Potash	66+48=114	or	43·84
One „ of Ditartrate of Sesquioxide of Iron	66+80=146	„	56·16
Equivalent	260.		100·

Formula...... $KO, C^4H^2O^5; Fe^2O^3, C^4H^2O^5$.

If however this salt contains 34 grs. of *pure* sesquioxide of iron *combined* with the excess of tartaric acid in the bitartrate of potash, the above formula cannot represent its constitution; in this case it would seem to consist of an equivalent of tartrate of potash, combined with an equivalent of the tristartrate of the sesquioxide of iron ($3Fe^2O^3, 2C^4H^2O^5$), and six equivalents of water.

Incompatibles.—As FERRI AMMONIO-CITRAS.

Impurities and Tests.—See Note in the text.

Medicinal Uses.—This preparation is advantageously exhibited in all cases in which chalybeates prove useful. From its slight taste it may be readily given when other preparations of iron prove nauseating. The dose is from gr. v. to gr. xv. given either in solution, or in the form of pill, combined with an aromatic, but it should not be long kept in either way; and in its perfect state it cannot be given in the form of powder, on account of its attracting moisture.

VINUM FERRI.

Wine of Iron.

Vinum Chalybeatum, P.L. 1721, P.L. 1746.
Vinum Ferri, P.L. 1788, P.L. 1809, edit. alt., P.L. 1824.

Take of Iron, drawn into Wire, an ounce,
Sherry Wine two pints;
Digest for thirty days, and strain.

Remarks.—This preparation, which was omitted from the last Pharmacopœia, is again introduced. It is a very weak and gentle chalybeate, probably consisting of tartrate of iron with traces of malate and acetate of this metal. Dose, fʒj. to f℥ss.

PRÆPARATA EX HYDRARGYRO.

PREPARATIONS OF MERCURY.

Remarks.—MERCURY is found native, but its principal and indeed only ore is the bisulphuret of mercury or cinnabar, which occurs in Spain, Bavaria, Carniola and Bohemia, in Europe, and also in China and California; this ore ground and distilled with lime or metallic iron furnishes the mercury of commerce, which as imported in iron bottles is usually very pure.

Mercury is a white brilliant metal, which differs from all others in being liquid at common temperatures, and remaining so till exposed to a cold of 40° below zero; it then becomes solid and malleable, its malleability increasing with the depression of temperature. At—40° its specific gravity is 14·391, at 32° 13·5959, and at 60° 13·556; it boils and vaporizes at about 670°, the specific gravity of its vapour being 6·976. It is perfectly volatilized by heat. It crystallizes in regular octohedrons; it is uniformly dilated by heat, a most valuable property which has long been advantageously applied in the thermometer. At common temperatures it emits a very slight vapour, but below 40° this ceases under the usual atmospheric pressure. Exposed to dry air it does not oxidize, unless by continual agitation with it, but just below its boiling-point it readily combines with oxygen, forming the precipitate *per se* of the olden chemists. It does not decompose water, even at 212°, but this liquid retains minute traces of mercury, probably in an extremely finely divided metallic state, which are incapable of separation by repose or filtration, when it has been boiled with or distilled from this metal. It is readily acted upon by nitric acid, whether concentrated or dilute, but sulphuric acid has no action on it, except when concentrated and boiling, hydrochloric acid is not decomposed by it under any circumstances. It combines with many of the metals; these compounds are termed *amalgams.* It is more convenient and more in accordance with the nomenclature adopted in the text of this work, to consider the equivalent of Mercury as double that employed by many continental and some British chemists, and with Erdmann and Marchand to regard it as being 200; its Symbol or Formula is Hg.

Adulterations, Impurities, and Tests.—The Mercury imported from the mines of Almaden in Spain is very pure, but this metal is susceptible of adulteration, as it forms liquid amalgams with several others, lead, tin and bismuth being used for this purpose. For tests see MATERIA MEDICA: *Hydrargyrum.* It may be purified by distillation or digestion with a solution of bichloride or of a nitrate of the metal. The characteristic tests of mercury are, that when in solution it is precipitated on a slip of bright copper in the metallic state, as a grey powder, which when rubbed, gives a brilliant silvery surface to the copper. When in a solid state, the substance, powdered and heated with lime in a test-tube, exhales metallic mercury, which is readily recognized under a magnifier by its brilliant globular form.

Pharmacopœia Preparations.—Emplastrum Ammoniaci cum Hydrargyro, Emplastrum Hydrargyri, Hydrargyrum cum Cretâ, Hydrargyri Chloridum, Hydrargyri Bichloridum, Hydrargyri Iodidum, Hydrargyri Nitrico-Oxidum, Hydrargyri Bisulphuretum, Pilula Hydrargyri, Unguentum Hydrargyri, Unguentum Hydrargyri Nitratis.

HYDRARGYRUM CUM CRETA.

Mercury with Chalk.

Hydrargyrus cum Cretâ, P.L. 1788, P.L. 1809.
Hydrargyrum cum Cretâ, P.L. 1809, edit. alt., P.L. 1824, P.L. 1836.

Take of Mercury three ounces,
Prepared Chalk five ounces;
Rub them together until globules are no longer visible.

A portion is vaporized by heat. The residue answers to the tests previously applied to Prepared Chalk.

Process.—I have been informed on authority upon which I can rely, that the addition of a small quantity of water greatly accelerates the operation here directed. The greater part of the mercury exists in a very finely divided metallic state, but I have found that a minute portion of it is, by the long trituration required, converted into protoxide, and this being the case the effects derived from the use of this medicine are readily accounted for.

Adulterations, Impurities and Tests.—See Note in the text. It is seldom adulterated, excepting when made with the black sulphuret of mercury, but is sometimes carelessly prepared, being insufficiently triturated.

Incompatibles.—Acids and acidulous salts act upon this preparation, and dissolve the chalk with the effervescence of carbonic acid gas.

Medicinal Uses.—It is one of the mildest of the mercurial preparations. Dose, as an alterative, gr. x. to gr. xxx.

HYDRARGYRI CHLORIDUM.

Chloride of Mercury.

Mercurius Dulcis Præcipitatus. Mercurius Dulcis Sublimatus. Calomelas, P.L. 1721.
Mercurius Dulcis Sublimatus, P.L. 1746.
Calomelas. Hydrargyrus Muriatus Mitis, P.L. 1788.
Hydrargyri Submurias, P.L. 1809, P.L. 1824.
Hydrargyri Chloridum, P.L. 1836.

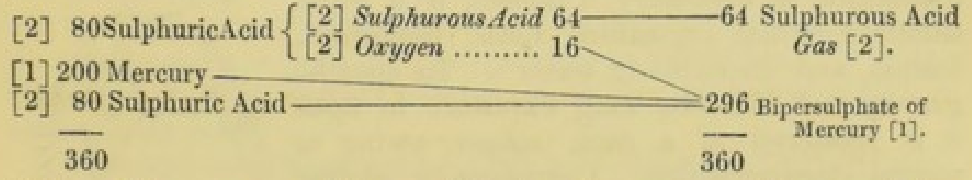
Take of Mercury four pounds,
Sulphuric Acid twenty one and a half fluidounces,
Chloride of Sodium a pound and a half;

Boil two pounds of the Mercury with the Acid, until the bipersulphate of mercury remains dry; rub this when it is cold with [the remaining] two pounds of Mercury in an earthenware mortar, that they may be perfectly mixed. Afterwards add the Chloride, and rub them together, until globules are no longer visible; then sublime. Rub the sublimate to the very finest powder, and wash it carefully with boiling distilled water and dry it.

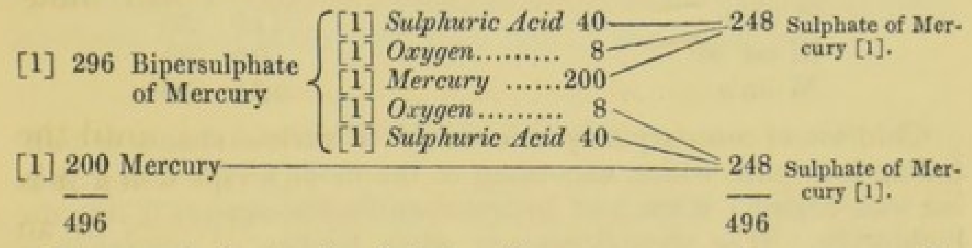
Pulverulent, whitish, is sublimed by heat. It is blackened by potash being added to it; afterwards, heat being applied, it agglomerates in globules of mercury. By the addition of nitrate of silver, of lime-water, or of hydrosulphuric acid, nothing is precipitated from the water in which it has either been washed or boiled.

Remarks.—There is no alteration of the process directed in the last Pharmacopœia, excepting the substitution of measure for weight with respect to the sulphuric acid, an advantageous alteration which has been uniformly carried out in other preparations.

Process.—When mercury and sulphuric acid are boiled together, the water contained in the latter is evaporated, and the reactions which occur are these: two eqs. of anhydrous sulphuric acid 80, are decomposed by one eq. of mercury 200, into two eqs. of *sulphurous acid* 64, which are expelled, and two eqs. of *oxygen* 16, which combine with the mercury and form one eq. of binoxide of mercury 216; this uniting with the two remaining eqs. of anhydrous sulphuric acid 80, there results one eq. of bipersulphate of mercury 296:

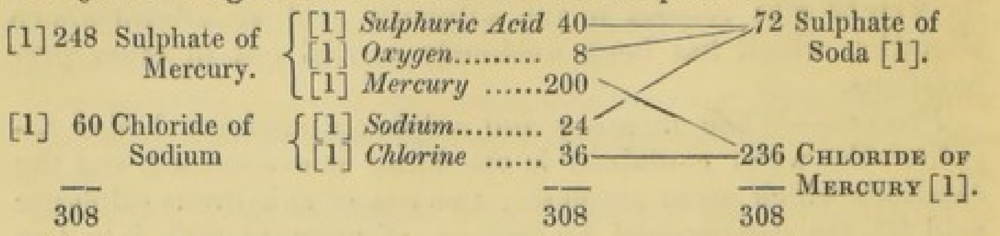


When this one eq. of bipersulphate of mercury 296, consisting of two eqs. of *sulphuric acid* 80, two eqs. of *oxygen* 16, and one eq. of *mercury* 200, is triturated with another eq. of mercury 200, it parts with one half of its oxygen and sulphuric acid to the second eq. of mercury, which is thus converted into one eq. of sulphate of mercury 248, and is itself reduced to the same salt, also becoming one eq. of sulphate of mercury 248:



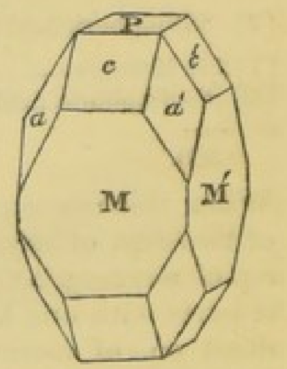
Two equivalents of sulphate of mercury are thus necessarily formed, but in explaining the changes by which it is converted into chloride of mercury, it is not requisite to consider more than one equivalent as undergoing them.

In preparing chloride of mercury, one eq. of this sulphate 248, consisting of one eq. of *mercury* 200, one eq. of *oxygen* 8, and one eq. of *sulphuric acid* 40, is mixed and heated with one eq. of chloride of sodium 60, composed of one eq. of *chlorine* 36, and one eq. of *sodium* 24; complete mutual interchange of elements ensues, the one eq. of sodium 24, unites with the one eq. of oxygen, to form one eq. of soda 32, which combining with the one eq. of sulphuric acid 40, yields one eq. of sulphate of soda 72, and this remains in the retort, whilst the one eq. of chlorine 36, thus set free, takes the one eq. of mercury 200, and forms one eq. of CHLORIDE OF MERCURY 236, which sublimes. I subjoin a diagram to illustrate this decomposition:



Many other processes have been devised for making this important preparation, but none have superseded the method above-described, which is still generally adopted by manufacturers of chemicals.

Properties.—Chloride, or as it is denominated when a pointed distinction is necessary, *Calomel*, is a white semitransparent crystalline mass, inodorous, insipid, and insoluble in water*. Its specific gravity is 7·175: by long exposure to light it is rendered of a dark colour, owing to partial decomposition. Occasionally perfect crystals are obtained, in which, although there does not appear to be any distinct cleavage, there are indications of it parallel to all the planes of a *square prism*, and this may be regarded as the primary form.



P on M, or M′	90°	00′
P on *a*	112	5
P on *c*	119	50
M on M′	90	00
M on *c*	150	10

Chloride of mercury may be obtained of various shades of buff, fading into pure white, according to the mode adopted of grinding and drying; nitric and hydrochloric acids convert it into the bichloride. It is phosphorescent when broken or scratched in the dark. It is much less volatile than the bichloride.

Composition.—It consists of

One equivalent of Mercury	200	or 84·75
One " of Chlorine	36	" 15·25
Equivalent	236.	100·

Formula..... Hg Cl.

Adulterations, Impurities, and Tests.—It has been adulterated

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* By long-continued ebullition with water, chloride of mercury affords a solution which yields copious precipitates with carbonate of soda and nitrate of silver. This is doubtless owing to the formation of bichloride and oxychloride of mercury. The chloride of mercury itself is strictly insoluble.—ED.

with sulphate of barytes, carbonate of lead, ammonio-chloride of mercury, and other white heavy insoluble powders, and it sometimes contains traces of bichloride, oxychloride, and a subnitrate of mercury. The tests ordered in the text will detect these adulterations or impurities, excepting the insoluble mercurial salts; which are difficult of detection unless they exist in considerable proportions. The ammonio-chloride, heated with lime or excess of potash, yields ammonia, which may be recognised by test-paper, and the subnitrate heated in a test-tube evolves nitrous fumes.

Incompatibles.—Chloride of mercury is immediately decomposed by potash, soda, and lime, and partially by ammonia, oxide of mercury being formed; carbonate of ammonia also produces decomposition, but the carbonates of potash and soda act less rapidly; bicarbonate of potash does not decompose it at all. By nitric acid it is partially converted into bichloride. It is decomposed by iron, copper and lead, and also by hydrosulphuric acid and its salts.

Pharmacopœia Preparation.—Pilula Hydrargyri Chloridi Composita.

Medicinal Uses.—It is an extremely efficient purgative, and it is alterative, antisyphilitic, and a valuable remedy in obstructions and hepatic affections. It is particularly useful in the diseases of children, and they frequently bear larger doses of it than adults. Dose as an alterative gr. ss. to gr. j. night and morning; as a purgative from gr. ij. to gr. x., or in some cases considerably more. Its insolubility and great specific gravity prevent its being eligibly exhibited in any other form than that of powder or pill.

HYDRARGYRI BICHLORIDUM.

Bichloride of Mercury.

Mercurius Sublimatus Corrosivus, P.L. 1721.
Mercurius Corrosivus Sublimatus vel *Albus,* P.L. 1746.
Hydrargyrus Muriatus, P.L. 1788.
Hydrargyri Oxymurias, P.L. 1809, P.L. 1824.
Hydrargyri Bichloridum, P.L. 1836.

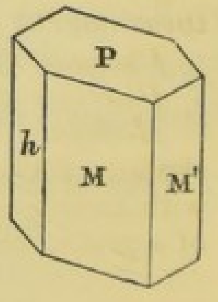
Take of Mercury two pounds,
Sulphuric Acid twenty one and a half fluidounces,
Chloride of Sodium a pound and a half;

Boil down the Mercury with the Acid, until the bipersulphate of mercury remains dry; rub this when it is cold with the Chloride in an earthenware mortar; then sublime with a heat gradually raised.

Crystalline is fused by heat, afterwards is sublimed. It is dissolved by water, by rectified spirit, and by ether. The precipitate from its watery solutions, potash, soda, or lime-water being added, is red; but when you add excess it is yellow. This, on the application of heat, evolves oxygen, and agglomerates in globules of mercury.

Remarks.—On referring to the preceding preparation it will be perceived, that only one half the quantity of mercury is here ordered, and that the intermediate stage of trituration with metallic mercury is omitted. In other particulars the process is similar to that already described, and the same decompositions ensue as detailed in the first and last of the diagrams inserted under Chloride of Mercury; excepting that in the present case, instead of sulphate of mercury being mixed with the chloride of sodium, the bipersulphate, a salt containing double the amount of oxygen and sulphuric acid is here employed, and instead of chloride of mercury, BICHLORIDE OF MERCURY results, which contains double the amount of chlorine existing in the former product; whilst two equivalents of sulphate of soda remain in the subliming vessel, in lieu of one equivalent of that salt. With these remarks I shall content myself with referring to the two diagrams alluded to, as explanatory of the present process, instead of repeating the diagrams, exchanging bipersulphate and bichloride of mercury for the sulphate and chloride of that metal in the last of them.

Properties.—The bichloride of mercury being volatile at the temperature at which it is formed, rises in vapour, and condenses into a white semitransparent crystalline mass, from which perfect crystals are occasionally procurable. The cleavages in the crystals of this substance are parallel to the lateral and to the terminal planes of *a right rhombic prism* of 93° 44′, which therefore may be regarded as the primary form.



P on M, or M′	90° 00′
M on M′	93 44
M on *h*	133 8

Bichloride of Mercury is inodorous; it has an acrid, metallic, and nauseous taste, which remains long in the mouth. It is a violent poison. Its specific gravity is 5·200. The specific gravity of its vapour is 9·4. Water at 60° dissolves rather more than 1-20th, and boiling water one-third of its weight; the solution reddens litmus paper. It is slightly volatile at common temperatures. Although light has no action upon this salt in its solid state, yet it partially decomposes the aqueous solution, and chloride of mercury is precipitated. It is much more soluble in alcohol, ether, hydrochloric acid, and solution of hydrochlorate of ammonia, than in water; ether abstracts it from its aqueous solution. When the alkalis potash and soda, or lime-water, are added to a solution of bichloride of mercury, they throw down a yellow precipitate, which is hydrated binoxide of mercury. Carbonate of lime decomposes the bichloride only partially, the substance obtained being oxychloride of mercury of a deep red colour; a similar effect is produced by lime, potash and soda, when used in the requisite proportion. With ammonia a white precipitate is obtained, as will be presently again noticed. It forms several double salts with the alkaline chlorides, &c., and combines with, or is decomposed by most organic substances.

Composition.—Bichloride of Mercury consists of

One equivalent of Mercury		200	or 73·55
Two ,, of Chlorine....	36×2=	72	,, 26·45
Equivalent........		272.	100·

Formula...... Hg Cl^2.

Adulterations, Impurities, and Tests.—This salt is seldom adulterated; the tests ordered in the text are quite sufficient to ensure its purity. It affords a white precipitate with solution of albumen, white of egg, which is the best antidote in cases of poisoning with this substance.

Incompatibles.—Ammonia, potash, soda, and their carbonates; lime-water, potassio-tartrate of antimony, nitrate of silver, the acetates of lead, sulphuret of potassium, and other soluble sulphurets, soap, many metals, infusions of bitter and astringent vegetables, and some vegetable bodies which possess neither of these qualities.

Pharmacopœia Preparation.—Liquor Hydrargyri Bichloridi.

Pharmacopœia Uses.—Hydrargyri Ammonio-chloridum.

Medicinal Uses.—It is frequently serviceable in secondary syphilis, and in some cutaneous diseases, particularly combined with an antimonial, in lepra. Dose, from one-eighth to one-fourth of a grain, made into a pill with crumb of bread.

LIQUOR HYDRARGYRI BICHLORIDI.

Solution of Bichloride of Mercury.

Liquor Hydrargyri Oxymuriatis, P.L. 1809, P.L. 1824.
Liquor Hydrargyri Bichloridum, P.L. 1836.

Take of Bichloride of Mercury,
Hydrochlorate of Ammonia, each ten grains,
Distilled Water a pint;
Dissolve.

Remarks.—A fluidounce contains half a grain of bichloride of mercury.

Dose, half a fluidrachm to two fluidrachms in infusion of linseed.

HYDRARGYRI AMMONIO-CHLORIDUM.

Ammonio-chloride of Mercury.

Mercurius Præcipitatus Albus, P.L. 1746.
Calx Hydrargyri Alba, P.L. 1788.
Hydrargyrus Præcipitatus Albus, P.L. 1809.
Hydrargyrum Præcipitatum Album, P.L. 1809, edit. alt., P.L. 1824.
Hydrargyri Ammonio-Chloridum, P.L. 1836.

Take of Bichloride of Mercury six ounces,
Distilled Water six pints,
Solution of Ammonia eight fluidounces;

Dissolve the Bichloride in the Water, with the application of heat. To this when it is cold add the Solution of Ammonia, frequently stirring. Wash the powder thrown down until it is free from taste, lastly, dry it.

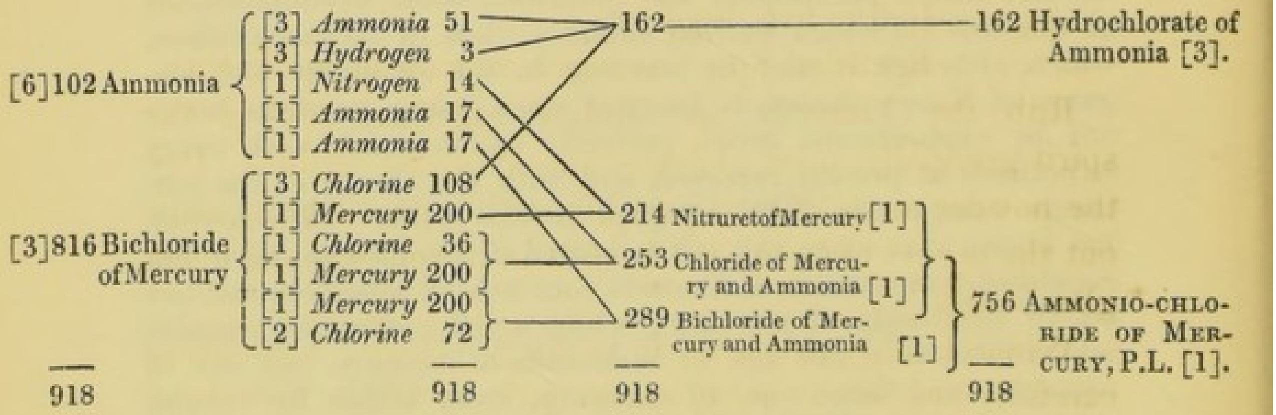
Pulverulent, white, is sublimed by heat. It is dissolved without effervescence in hydrochloric acid. Heated with solution of potash it evolves ammonia and assumes a yellow colour.

Remarks.—There are few salts the nature of which has been so closely contested as the ammonio-chloride of mercury, and various statements have been made respecting its composition. In some former Pharmacopœias this preparation was obtained by the addition of solution of carbonate of potash and hydrochlorate of ammonia to that of the bichloride of mercury; the more direct method of employing solution of ammonia is now substituted; late researches have however rendered it probable that the salt prepared by the intervention of carbonate of potash and hydrochlorate of ammonia, differs from that now directed to be made by adding ammonia directly to a solution of bichloride of mercury, and that whilst the former certainly contains oxygen, the latter, the Hydrargyri Ammonio-chloridum of the last and present Pharmacopœias, contains none of this element. This salt is regarded by Sir R. Kane as a chloramidide of mercury, or double chloride and amide of mercury, its formula being $Hg\ 2Cl,\ Hg\ 2NH^2$. It has been subjected to rigorous examination by Duflos, Riegel, and by Mitscherlich, who are unanimous in their belief that this compound is destitute of oxygen; the last-named philosopher has described some decompositions of this salt on which we may found a view of its constitution, which, although it may be wanting in the simplicity and elegance of Kane's theory, is founded upon better grounds, borne out by experimental proof, perfectly reconcileable with every hypothesis at present received, and with the theory of the ammonia compounds, NH^3, adopted in this work. Mitscherlich has shown that when this salt is heated at a somewhat high but regulated temperature, it liberates four eqs. of ammonia and one eq. of bichloride of mercury; whilst a red compound remains which consists of two eqs. of bichloride of mercury, two eqs. of nitrogen, and three eqs. of mercury, from which by careful management the bichloride of mercury may be expelled and a true nitruret of mercury obtained. Thus we may regard this salt as a compound of two double salts and a nitruret of a metal, and as constituted of

One eq. of Bichloride of Mercury and Ammonia	272 + 17 = 289
One „ of Chloride of Mercury and Ammonia..	236 + 17 = 253
One „ of Nitruret of Mercury	200 + 14 = 214
Equivalent......	756

Formula...... $Hg\ Cl^2,\ NH^3;\ Hg\ Cl,\ NH^3,\ HgN.$

Process.—When ammonia is added to bichloride of mercury, half the chlorine is separated and combines in some form with ammonia, forming hydrochlorate of ammonia, whilst the whole of the mercury is precipitated. Assuming the above theory of the constitution of this salt to be correct, the following changes occur when three eqs. of bichloride of mercury 816 are decomposed by six eqs. of ammonia 102. The three eqs. of bichloride of mercury 816, consisting of three eqs. of *mercury* 600, and six eqs. of *chlorine* 216, first part with three eqs. of chlorine 108, which combine with three eqs. of hydrogen 3, derived from the decomposition of one eq. of ammonia 17, consisting of one eq. of *nitrogen* 14, and three eqs. of *hydrogen* 3, and these form three eqs. of hydrochloric acid 111, which combining with three eqs. of ammonia 51, produce three eqs. of hydrochlorate of ammonia 162, remaining in solution. The one eq. of nitrogen 14, liberated by this decomposition, unites with one eq. of mercury 200, to form one eq. of nitruret of mercury 214, whilst another eq. of mercury 200, combining with one eq. of chlorine 36, and one eq. of ammonia 17, to form one eq. of chloride of mercury and ammonia 253, which unites with the one eq. of nitruret of mercury; the remaining one eq. of mercury 200, two eqs. of chlorine 72, and one eq. of ammonia 17, yield one eq. of bichloride of mercury and ammonia 289, which combining with the former compound, chloronitruret of mercury and ammonia, form the AMMONIO-CHLORIDE OF MERCURY of the Pharmacopœia.



When this salt is exposed to heat, the one eq. of bichloride of mercury and ammonia 289 is decomposed into one eq. each of bichloride of mercury 272, and of ammonia 17; whilst the one eq. of chloronitruret of mercury and ammonia 467 is also decomposed and converted into one eq. of ammonia 17, which volatilizes with the preceding sublimate, and one eq. of chloronitruret of mercury 450, which by increased heat is again decomposed, and doubling the equivalent for convenience' sake 900, yields one eq. of bichloride of mercury 272 which sublimes, and one eq. of subsesquinitruret of mercury 628, a brown detonating powder, the formula of which is $Hg^3 N^2$[*].

Properties.—In addition to the properties above described this salt is inodorous, insipid and insoluble in water, but decomposed by boiling water into hydrochlorate of ammonia, which remains in solution, and a heavy yellow powder, insoluble in water, and containing oxygen.

Adulterations, Impurities, and Tests.—See Note in the text. It is sometimes adulterated with chalk and sulphate of lime, to detect which the tests ordered are quite sufficient.

Medicinal Use.—It is employed only externally in cutaneous affections.

Pharmacopœia Preparation.—Unguentum Hydrargyri Ammonio-chloridi.

HYDRARGYRI IODIDUM.

Iodide of Mercury.

Hydrargyri Iodidum, P.L. 1836.

Take of Mercury an ounce,
Iodine five drachms,
Rectified Spirit as much as may be sufficient;

Rub the Mercury and Iodine together, adding the spirit gradually, until globules are no longer visible. Dry the powder as quickly as possible, with a gentle heat, without the access of light, and keep it in a well-stopped black glass vessel.

When freshly prepared it is dingy yellow; heat being carefully applied, it sublimes in red crystals, which soon change to yellow; afterwards they are blackened by the admission of light. It is not dissolved by chloride of sodium.

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[*] The author of this work long regarded this compound as consisting of Bichloride of Mercury, Binoxide of Mercury, and Ammonia; but had he developed his later views respecting its constitution, we doubtless should have found a considerable modification of his opinion upon this point, and that he would have accepted the unanimous decision of those chemists who have lately investigated this salt. For the theory and views above developed the Editor is alone responsible.—Ed.

Properties.—This compound is a greenish-yellow powder of specific gravity 7·6; it is devoid of smell, and insoluble in water. It should not be exposed to light, as by its action, and also by that of heat, it is apt to be resolved into mercury and biniodide; when quickly heated, however, it sublimes nearly or quite unaltered. It is composed of

One equivalent of Mercury......	200	or 61·35
One „ of Iodine........	126	„ 38·65
Equivalent......	326.	100·

Formula...... HgI.

Mercury forms several other compounds with Iodine, of which the biniodide, a beautiful scarlet preparation, was inserted in the last Pharmacopœia, but is now omitted.

Adulterations, Impurities, and Tests.—It is not subject to adulteration, but is usually impure from the formation of a portion of biniodide of mercury, a much more active preparation; on this account, especially if intended for internal use, this compound should be well washed with hot rectified spirit, in which the biniodide is readily, although the protiodide itself is but most sparingly soluble. See Note in the text.

Pharmacopœia Preparation.—Unguentum Hydrargyri Iodidi.

Medicinal Uses.—It has been given internally in scrofulous habits, from gr. j. to gr. iij.; but it is chiefly employed in the form of ointment.

HYDRARGYRI NITRICO-OXIDUM.

Nitric-oxide of Mercury.

Mercurius Præcipitatus Corrosivus, P.L. 1721.
Mercurius Corrosivus Ruber, P.L. 1746.
Hydrargyrus Nitratus Ruber, P.L. 1788.
Hydrargyri Nitrico-oxydum, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Mercury three pounds,
Nitric Acid eighteen fluidounces,
Distilled Water two pints;

Mix, and apply a gentle heat until the Mercury is dissolved. Boil down the solution and rub the residue to powder. Put this into another very shallow vessel; then apply a slow fire, and gradually increase it until red vapour ceases to arise.

It occurs in shining red crystalline scales, and is sublimed by a strong heat, evolving no red fumes. It is dissolved in hydrochloric acid and in nitric acid.

Remarks.—This is the Binoxide of Mercury, and is the only oxide of mercury retained in the Pharmacopœia. Mercury combines with two proportions of oxygen: the first, or *Oxide of Mercury*, is best prepared by the process inserted in the Pharmacopœia of 1836, which I subjoin.

HYDRARGYRI OXYDUM, P.L. 1836.

Oxide of Mercury.

Hydrargyri Oxydum Cinereum, P.L. 1809, P.L. 1824.

Take of Chloride of Mercury an ounce,
Lime-Water a gallon;

Mix and frequently shake them. Set by, and when th Oxide has subsided, pour off the liquor. Lastly, wash it in distilled Water until nothing alkaline can be perceived, and dry it, wrapped in bibulous paper, in the air.

Properties.—It is nearly black, insoluble in water and the alkalis, but dissolves readily in nitric acid; it decomposes and is decomposed by hydrochloric acid, which reconverts it to chloride of mercury, with the formation of water. It is totally volatilized by heat, and resolved by its action and that of light, into metallic mercury, and the binoxide.

Composition.—It is composed of

One equivalent of Mercury......	200 or	96·16
One ,, of Oxygen	8 ,,	3·84
Equivalent......	208.	100·

Formula...... HgO.

It has been already remarked that when mercury is heated nearly to its boiling-point, its vapour combines with the oxygen of the air; when this process is effected in long-necked glass vessels of a peculiar shape, heavy brick-red crystals are formed; these were the *precipitate per se* of the older chemists, and the *Mercurius Calcinatus*, P.L. 1746, *Hydrargyrus Calcinatus*, P.L. 1788, and *Hydrargyrum Oxydum Rubrum*, P.L. 1809 and P.L. 1824. This is the second or Binoxide of Mercury, and may be obtained in several different ways, of which the process above directed for preparing the Hydrargyri Nitrico-Oxidum is the one selected by the College.

Process.—The changes which occur when under ordinary circumstances a metal is acted upon by nitric acid, has already been explained under BISMUTHI NITRAS, so that it is unnecessary to repeat either the explanation or the diagram. In this case a nitrate of the oxide of mercury is in the first place formed, and held in solution by some excess of nitric acid. When this nitrate of mercury, evaporated to dryness, is heated in an open vessel, it is decomposed, a mixture of nitric oxide gas and nitrous acid being evolved, and the oxide of mercury being still further oxidized remains as binoxide of mercury in the vessel.

Properties.—This preparation is of a bright red colour, and shining crystalline appearance; it sometimes contains a little undecomposed nitrate, and has on this account been called, but improperly, subnitrate of mercury. When very hot its colour is almost black, passing as it cools through all the intermediate shades to a bright orange red. Its specific gravity is 11·074.

Binoxide of Mercury according to its mode of preparation is of a brick-red, orange-red, or orange-yellow powder, slightly soluble in water, which solution possesses a metallic taste, and exhibits slight alkaline properties. It appears to exist in two distinct allotropic conditions. When heated to redness it evolves oxygen, metallic mercury being reproduced. It was from this compound that Dr. Priestley, on the 1st of August 1774, obtained Oxygen Gas, a discovery which we may fairly regard as the starting-point of chemical science. It consists of

One equivalent of Mercury		200	or	92·6
Two „ of Oxygen	8×2=	16	„	7·4
Equivalent		216.		100·

Formula ...... Hg O^2.

Adulterations, Impurities, and Tests.—This preparation is sometimes adulterated with red lead, red ochre, or brickdust, and it may be impure from the nitrate of mercury not having been thoroughly decomposed; to detect these adulterations or impurities, the tests ordered in the text are quite sufficient. The salts of the oxide of mercury give a white precipitate with chloride of sodium, a black or greyish-black with ammonia and the fixed alkalis. The salts of the binoxide yield orange-coloured precipitates with the fixed alkalis, white with ammonia, and yellow, quickly changing to brilliant scarlet, with iodide of potassium, soluble in excess of the precipitant.

Incompatibles.—Acids, acidulous salts, and sulphurets.

Pharmacopœia Use.—Unguentum Hydrargyri Nitrico-Oxidi.

Medicinal Use.—Externally as an escharotic.

HYDRARGYRI BISULPHURETUM.

Bisulphuret of Mercury.

Cinnabaris Factitia, P.L. 1746.
Hydrargyrus Sulphuratus Ruber, P.L. 1788.
Hydrargyri Sulphuretum Rubrum, P.L. 1809, P.L. 1824.
Hydrargyri Bisulphuretum, P.L. 1836.

Take of Mercury two pounds,
Sulphur five ounces ;

Mix the Mercury with the Sulphur melted over the fire, and, as soon as the mass swells, remove the vessel from the fire, and cover it quickly lest accension should occur; then rub [the mass] to powder and sublime it.

It is sublimed by heat. Potash being added, the mercury agglomerates in globules.

Process.—By the action of heat in the first instance, combination takes place between one equivalent of mercury 200, and two equivalents of sulphur 32; by continuing it, the excess of the latter appears to be expelled, and by sublimation, the red, or bisulphuret of mercury, is obtained. It is an instance of the combination of two elements, the most simple and direct mode of chemical action ; as an example of such I subjoin a diagram :

[1] Mercury 200——=232 Bisulphuret of Mercury [1].
[2] Sulphur 32——
232 232

Properties.—In mass, this substance is of a dark colour, but when reduced to fine powder, it is of a brilliant red, and is then usually called vermilion. It is inodorous and insipid; insoluble in water, and unalterable by exposure to the combined action of air and moisture. When heated to redness in an open vessel, the sulphur is converted into sulphurous acid, and the mercury escapes in vapour. It is decomposed when distilled with lime, potash, or soda, and also by several of the metals producing metallic mercury.

When it is heated with sulphuric acid, sulphurous acid is evolved and a sulphate of mercury is formed. It is insoluble in nitric or in hydrochloric acid; but when they are mixed, the chlorine evolved acts upon and decomposes the bisulphuret, even without the assistance of heat.

It occurs native, and is the chief ore of mercury; it is sometimes crystallized in rhombic and hexahedral prisms.

Composition.—Bisulphuret of Mercury consists of

One equivalent of Mercury..............		200	or	86·01
Two „ of Sulphur	16×2=	32	„	13·99
Equivalent......		232.		100·

Formula...... $Hg S^2$.

Adulterations, Impurities, and Tests.—It is said to be adulterated with red-lead and *colcothar*, red oxide of iron; dichromate of lead is also employed for this purpose; any of these would be detected by the tests ordered in the text. If *realgar*, the red sulphuret of arsenic, should have been used, ignition with a little charcoal powder will produce the characteristic alliaceous odour of metallic arsenic.

Medicinal Uses.—It is employed for the purpose of mercurial fumigations by heating ʒss. of it on red-hot iron.

PRÆPARATA EX MAGNESIO.

PREPARATIONS OF MAGNESIUM.

MAGNESIA.

Magnesia.

Magnesia Usta, P.L. 1788.
Magnesia, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Carbonate of Magnesia a pound.

Burn it for two hours in a very strong fire.

Moistened with water it slightly changes the colour of turmeric to brown: it is dissolved in hydrochloric acid without effervescence; from this solution nothing is precipitated, either by the addition of bicarbonate of potash or of chloride of barium.

Remarks.—MAGNESIA is the only known oxide of magnesium, a metal discovered by Davy. This metal is obtained by igniting anhydrous chloride of magnesium with potassium, the results being chloride of potassium and *Magnesium,* which is of a silvery white colour, malleable, fusible at a red heat, is not tarnished in dry air, and does not decompose water. Heated to redness in air it takes fire, emits a brilliant light, and is converted into magnesia. Becquerel states that it crystallizes in octohedrons, and Playfair and Joule give 2·240 as its specific gravity. Its equivalent is 12, and symbol or formula Mg.

Process.—Carbonate of Magnesia parts with its carbonic acid at a high temperature, and the magnesia remains pure.

Properties.—Magnesia is infusible, colourless, inodorous, and tasteless if pure; it becomes phosphorescent when strongly heated; its specific gravity is about 2·3; it does not, like lime, become hot when mixed with water; it is very nearly insoluble in water, and although the moistened earth exhibits alkaline properties by turning vegetable blues green, and yellows brown, yet water in which it has been agitated does not dissolve enough to produce this effect, as lime-water readily does. It combines and forms a definite hydrate with water. The gelatinous hydrate is recommended as an antidote in cases of poisoning with arsenious acid. By exposure to the air it slowly attracts carbonic acid and is reconverted to carbonate. It combines readily with acids to form salts, which possess a bitter taste. It consists of

One equivalent of Magnesium	12	or 60
One ,, of Oxygen	8	,, 40
Equivalent......	20.	100.

Formula...... MgO.

Adulterations, Impurities, and Tests.—It is seldom adulterated. It sometimes contains a little lime, sulphate of soda, and carbonate of magnesia, which may be detected by the tests ordered in the text. Its characteristic tests are its ready solubility in dilute sulphuric acid, and the arenaceous crystalline precipitate it forms, when phosphate of soda is added to an ammoniacal solution containing magnesia, and rapidly stirred with a glass rod. In the solid state, when moistened with nitrate of cobalt, and ignited by the blowpipe, it assumes a rose-pink colour.

Incompatibles.—Acids, Acidulous and Metallic Salts.

Medicinal Uses.—Antacid, and when acidity prevails, purgative; it is preferable to the carbonate whenever the bowels are distended with flatus; in other respects its virtues are the same. Dose, ʒss. to ʒj.

MAGNESIÆ CARBONAS.

Carbonate of Magnesia.

Magnesia Alba, P.L. 1788.
Magnesiæ Carbonas, P.L. 1809.
Magnesiæ Subcarbonas, P.L. 1824.
Magnesiæ Carbonas, P.L. 1836.

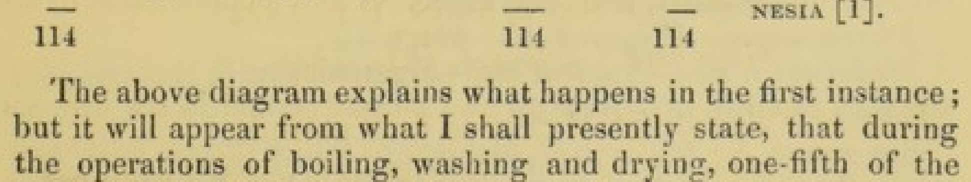
Take of Sulphate of Magnesia four pounds,
Carbonate of Soda four pounds and nine ounces,
Distilled Water, boiling, four gallons;

Dissolve separately the Carbonate and Sulphate in two gallons of the Water, and strain; then mix the solutions, and boil, stirring constantly with a spatula for two hours, distilled water being frequently added, so that it may fill about the same measure; lastly, the liquor being poured off, wash the precipitated powder with boiling distilled water, and dry it.

It is dissolved in dilute sulphuric acid. From this solution, when effervescence has ceased, nothing is precipitated by bicarbonate of potash. The water in which it has been boiled does not change the colour of turmeric to brown, nor is anything precipitated, on the addition either of chloride of barium or nitrate of silver.

Remarks.—Magnesia combines with carbonic acid and water in several definite proportions; the composition of the carbonate prepared by the above process will be given below. A very beautiful variety of this salt is extensively made and sold unde the name of *heavy carbonate of magnesia.*

Process.—Regarding the sulphate of magnesia, the carbonate of soda, and the resulting carbonate of magnesia as anhydrous for convenience' sake, the following changes take place. One equivalent of sulphate of magnesia 60, consists of one eq. of *magnesia* 20, and one eq. of *sulphuric acid* 40, and one eq. of carbonate of soda 54, of one eq. of *soda* 32, and one eq. of *carbonic acid* 22; when solutions of these salts are mixed, double decomposition ensues, the one eq. of magnesia 20, unites with the one eq. of carbonic acid 22, and these form 42 or one eq. of CARBONATE OF MAGNESIA, whilst the one eq. of sulphuric acid 40, combining with the one eq. of soda 32, produces one eq. of sulphate of soda 72, as illustrated in the following diagram:



The above diagram explains what happens in the first instance; but it will appear from what I shall presently state, that during the operations of boiling, washing and drying, one-fifth of the carbonic acid is replaced by water.

Composition.—Carbonate of Magnesia is when native, or obtained in crystals from a solution of carbonate of magnesia in water charged with carbonic acid, or whilst moist, exclusively of water in each case, composed of

One equivalent of Magnesia	20	or	47·6
One ,, of Carbonic Acid	22	,,	52·4
Equivalent	42.		100·

But my analysis of the Pharmacopœia preparation, since confirmed by Dr. Fownes, gave very nearly

Carbonic Acid	36·
Magnesia	40·8
Water	23·2
	100·

It may therefore be regarded as a compound of

One equivalent of Bihydrate of Magnesia	38
Four ,, of Hydrated Carbonate of Magnesia	204
Equivalent	242

Formula...... $MgO, 2HO; 4MgO, CO^2, HO$,

which will give in 100 parts

Carbonic Acid	36·3
Magnesia	41·3
Water	22·4
	100·

It appears, therefore, that when five equivalents of sulphate of magnesia are decomposed by carbonate of soda, four equivalents of the magnesia are converted into a hydrated carbonate, and one equivalent, having its carbonic acid replaced by two equivalents of water, becomes bihydrate of magnesia.

Properties.—Carbonate of magnesia is colourless, inodorous and insipid; it is insoluble in water, readily decomposed by and dissolved in most acids, and loses its carbonic acid and water when strongly ignited.

Impurities, Adulterations, and Tests.—It is seldom adulterated. The presence of lime, traces of carbonate or sulphate of soda, or of a chloride are recognized by the tests directed in the text.

Incompatibles.—Acids and acidulous and metallic salts, hydrochlorate of ammonia, and lime-water.

Pharmacopœia Preparation.—Magnesia.

Medicinal Uses.—Antacid and purgative, and in the uric acid diathesis in doses of ℈j. to ʒj.

Sulphate of Magnesia, commonly called Epsom salts, was originally procured from a spring at that place. It is one of the saline ingredients of sea-water, and for a long time it was procured only from the *bittern*, or mother-liquor from sea-water, remaining after the preparation of common salt; thus obtained it was generally mixed with so considerable a quantity of chloride of magnesium, that owing to the deliquescent property of the latter salt, the sulphate was usually damp. It has since been prepared from magnesian limestone, by a very ingenious process, invented by the late Dr. Henry, and the salt so formed being unmixed with chloride of magnesium, does not attract moisture from the air.

When fuming sulphuric acid is poured upon magnesia, they combine with intense heat, and even incandescence. Sulphate of Magnesia crystallizes with great readiness, and although the crystals are usually small, being so manufactured for the sake of ready and convenient exhibition, they may readily be obtained of considerable size by slowly cooling the solution. The primary form of this substance may be regarded as a *right prism* with a *rhombic base*, whose angles are 90° 30′ and 89° 30′.

There is only one cleavage, which is parallel to the short diagonal of the prism, and consequently to the plane *h* of the accompanying figures.

Fig. 1. represents a crystal of a form which frequently occurs, and of which the following are the measurements:

M on M′ (primary)....	90°	30′
M on *h*..............	134	45
M on *e*..............	129	00
a on *a′*	120 nearly.	

Fig. 1.

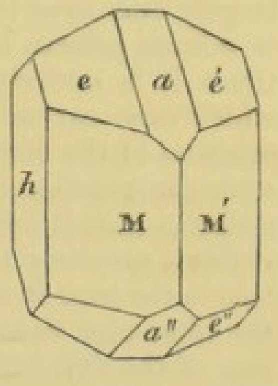


Fig. 2.

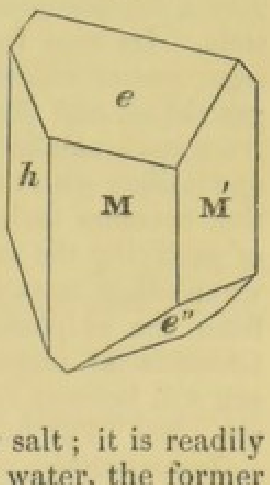


Fig. 2. represents a form in which the crystals also frequently appear; in this form only two of the four planes *e* are seen on each summit, and alternating in position as shown in the figure.

On some of the crystals, however, which resemble this figure, the two other planes *e* may be perceived, but they are very minute.

Sulphate of Magnesia is an extremely bitter salt; it is readily soluble in cold water, and still more so in hot water, the former dissolving an equal weight, and the latter one-third more. At 32° 100 parts of water dissolve 25·76 parts of the anhydrous salt, and 0·26565 part for every additional degree of heat. It slowly effloresces by exposure to the air, and when heated it loses its water of crystallization. When ignited an opaque mass is obtained of specific gravity 2·6066. It forms five definite hydrates with water, the anhydrous salt combining with one, two, six, seven, and twelve equivalents of water, of which the two first are amorphous, and the three last crystalline. The crystalline salt with seven eqs. of water is the ordinary sulphate, the "Epsom salts" of the shops: this is composed of

One equivalent	of Magnesia............	20	or 16·26
One „	of Sulphuric Acid	40	„ 32·52
Seven „	of Water	9×7=63	„ 51·22
	Equivalent.....	123.	100·

Formula...... $MgO, SO^3, 7HO$.

Adulterations, Impurities, and Tests.—Sulphate of Soda is largely employed to adulterate "Epsom salts," being crystallized in minute prisms, to simulate the sulphate of magnesia. Sometimes it is entirely substituted for the magnesian sulphate, in which case carbonate of soda will produce no precipitate in a solution of the suspected salt. It is usually, however, intermixed with the genuine salt. In this case the crystals are always irregular in size, it being very difficult to obtain sulphate of soda in crystals precisely the size of the Epsom salts of commerce. If this is the case it effloresces quickly, and the dried salt will tinge the blow-pipe flame of a dull yellow red; when a solution of 100 grs. of the dry, but *not effloresced*, sulphate of magnesia is mixed with a hot solution of 110 grs. of crystallized carbonate of soda, the supernatant solution will not affect turmeric paper, and will give a further precipitate on the addition of more carbonate of soda. Its most frequent impurities are traces of protosulphate of iron, and of chloride of magnesium. The former is difficult to get rid of, and this is important as it stains the magnesia prepared from such sulphate of a pink colour; gentle roasting, solution, and boiling with the addition of caustic soda, added until the solution becomes turbid with hydrate of magnesia, is the best method of purifying the salt. The presence of iron may be recognized when other tests fail, by the pink tint the carbonate, prepared from the sulphate of magnesia, acquires when briskly ignited. Chloride of magnesium is a harmless impurity; if present, the salt will become damp and clammy to the touch when exposed to air. See MATERIA MEDICA: *Magnesiæ Sulphas.*

Incompatibles.—Sulphate of magnesia is incompatible with the alkalis potash and soda, and their carbonates, but the bicarbonates and sesquicarbonates do not decompose it until part of the carbonic acid is expelled by heat. Ammonia decomposes it but partially, and the sesquicarbonate not at all. Lime-water and chloride of calcium are both incompatible with this salt, and so also are the acetates of lead.

Pharmacopœia Preparation.—Magnesiæ Carbonas.

Medicinal Use.—As a purgative. Dose, ℥ss. to ℥j.

PRÆPARATA E PLUMBO.

PREPARATIONS OF LEAD.

Lead is obtained from its chief ore, *galena*, which is a sulphuret of lead. When pure, which is seldom or never the case with the lead of commerce, this metal is of a brilliant bluish-grey colour, which rapidly tarnishes in the air; it is very soft and ductile. Its specific gravity is 11·337, and it crystallizes in octohedrons. It does not decompose water, but when exposed to the joint action of water, free from saline impurity, and air, it is gradually acted upon, producing hydrated oxide and carbonate of lead, and rendering the water poisonous. It fuses at about 612°, and apparently volatilizes at very elevated temperatures. The equivalent of lead is 104, and its symbol or formula Pb. Lead combines with oxygen in four different proportions, and although the first and the third are respectively resolvable into oxide and metallic lead, and into oxide and binoxide, there is good evidence for believing each of the four to be a true and distinct oxide of this metal.

				Formulæ.
2	Equivalents	of Lead 104×2=208	form Dinoxide of Lead...216...	$Pb^2 O$.
1	„	of Oxygen 8		
1	„	of Lead 104	„ Oxide of Lead ......112...	$Pb\ O$.
1	„	of Oxygen 8		
4	„	of Lead 104×4=416	„ Deutoxide of Lead 456...	$Pb^4 O^5$.
5	„	of Oxygen 8×5= 40		
1	„	of Lead 104	„ Binoxide of Lead ...120...	$Pb\ O^2$.
2	„	of Oxygen 8×2= 16		

Of these, the second possesses strongly marked basic properties, the fourth oxide evinces the properties of an acid, whence it has been termed *Plumbic Acid*, and the third "Minium," or "Red-lead," has been regarded as ***Plumbate of the oxide of lead.*** Of these, the second is the only one employed in the Pharmacopœia, and I shall therefore confine myself to the consideration of the

Properties of Oxide of Lead.—This oxide combines with acids to form salts; when prepared by heating lead exposed to the air in the process of making red-lead, it has a pale yellow colour, and is called in commerce *massicot*; while *litharge*, which is the oxide directed to be used by the College, is obtained during the separation of silver from lead, and having undergone partial fusion and crystallization, it has a different appearance from massicot, though its composition is similar.

Oxide of lead is very slightly soluble in water, and combines with it to form a definite hydrate. It is fusible at a bright red heat, and in this state readily combines with silica, forming a glass, which is the basis of that variety termed "crystal." When its hydrate is boiled in a solution of soda, specific gravity about 1·45, this oxide crystallizes from the solution in rose-coloured cubes, soluble with difficulty in nitric acid; another allotropic condition, a minium-red powder, very soluble in acids, of oxide of lead has also been described. Oxide of lead decomposes the alkaline chlorides, and hydrochlorate of ammonia, and readily combines and forms definite salts with the acids.

Adulterations, Impurities, and Tests.—*Litharge*, the Plumbi Oxidum of the Pharmacopœia, is seldom adulterated; it usually however contains some few impurities, as traces of silica, oxides of iron and copper, &c. For tests, see MATERIA MEDICA: *Plumbi Oxidum.* The characteristic tests of lead are a white precipitate with a caustic alkali soluble in excess of the precipitant; a white precipitate with dilute sulphuric acid blackened by hydrosulphuric acid, and a brilliant yellow precipitate with chromate of potash.

Pharmacopœia Preparations.—Ceratum Saponis Composita, Emplastrum Plumbi, Liquor Plumbi Diacetatis.

LIQUOR PLUMBI DIACETATIS.

Solution of Diacetate of Lead.

Aqua Lithargyri Acetati, P.L. 1788.
Liquor Plumbi Acetatis, P.L. 1809.
Liquor Plumbi Subacetatis, P.L. 1809, edit. alt., P.L. 1824.
Liquor Plumbi Diacetatis, P.L. 1836.

Take of Acetate of Lead two pounds and three ounces,
Oxide of Lead, rubbed to powder, one pound and four ounces,
Distilled Water six pints;

Boil them for half an hour, frequently stirring, and when the liquor is cold, add of distilled water as much as may be sufficient to fill six pints; lastly strain. It is to be kept in well-closed vessels.

Limpid; its specific gravity is 1·260. In its other characteristics it agrees with Acetate of Lead as before indicated, excepting the last of them.

Remarks.—Oxide of lead forms six distinct compounds with acetic acid, of which four are basic salts; of these latter, the one employed in medicine is a compound of one equivalent of acid and two equivalents of base, forming a subsalt called a *diacetate.*

Process.—When one eq. of acetate of lead 163 (anhydrous), consisting of one eq. of *oxide of lead* 112, and one eq. of *acetic acid* 51, is boiled in water with one eq. of oxide of lead 112, they combine and form the diacetate of lead above mentioned, as is shown by the subjoined diagram.

[1] 163 Acetate of Lead { [1] *Acetic Acid...* 51
{ [1] *Oxide of Lead* 112
[1] 112 Oxide of Lead .... 112 — 275 DIACETATE OF LEAD [1].
275 275

Properties.—This preparation is colourless; it has an astringent sweetish taste; its specific gravity is 1·260. It is decomposed by hard water; distilled water, which contains the smallest portion of carbonic acid, also decomposes this solution. This preparation is very often improperly made with the residue of the distillation of vinegar; it has then a very dark colour, and ought to be rejected.

Composition.—This solution, as its name imports, contains diacetate of lead, composed of

Two equivalents of Oxide of Lead ..	112×2=224	or 81·5
One " of Acetic Acid	51	" 18·5
Equivalent........	275.	100·

Formula...... $C^4 H^3 O^3, 2PbO$.

It forms a crystalline salt combined with two eqs. of water, resembling acetate of potash, and its alcoholic solution yields anhydrous crystals possessing the composition given above.

Incompatibles.—It is decomposed by all those acids and their compounds which form, with oxide of lead, salts nearly insoluble in water, as the sulphuric, hydrochloric, carbonic, citric, and tartaric acids, &c. It is decomposed by lime-water; by the alkalis potash and soda; but, if added in excess, they redissolve the precipitate at first formed. Hard water usually contains four ingredients which decompose diacetate of lead, viz. carbonic acid gas, carbonate of lime, sulphate of lime, and common salt; and hence when dissolved in such water, the solution is always turbid. It is decomposed by hydrosulphuric acid and its salts, which give a black sulphuret: Liquor Ammoniæ Acetatis also decomposes it, on account of the carbonic acid diffused through it.

Pharmacopœia Preparations.—Ceratum Plumbi Compositum, Liquor Plumbi Diacetatis Dilutus.

Medicinal Uses.—External in superficial and phlegmonic inflammations of the skin.

ACETATE OF LEAD is now transferred to Materia Medica; it is very generally met with, and sufficiently pure for medicinal purposes; yet as the process given in the last Pharmacopœia yields a very beautiful salt, I shall reinsert it.

PLUMBI ACETAS, P.L. 1836.

Acetate of Lead.

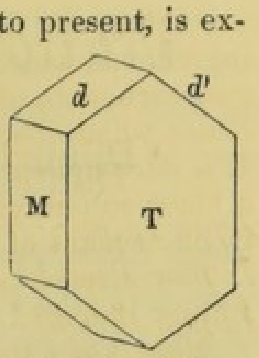
Saccharum Saturni, P.L. 1721, P.L. 1746.
Cerussa Acetata, P.L. 1788.
Plumbi Superacetas, P.L. 1809.
Plumbi Acetas, P.L. 1824.

Take of Oxide of Lead, rubbed to powder, four pounds and two ounces,
Acetic Acid,
Distilled Water, each four pints;

Mix the Acid with the Water, and add the Oxide of Lead to them, and a gentle heat being applied dissolve it: then strain. Lastly, evaporate the liquor that crystals may be formed.

Properties.—Acetate of Lead, *Sugar of Lead*, is crystalline, colourless, nearly inodorous, of a sweetish astringent taste, and is poisonous; it suffers but little change by exposure to the air. The crystals are usually very small; but if they are suffered to form slowly, they may be obtained of considerable size. Their primary form appears to be *a right oblique-angled prism*; the only modification which it has been as yet observed to present, is exhibited in the annexed figure:—

d on *d′*	128°	0′
d on M	116	0
d on T	98	30
M on T	109	32



100 parts of water at 60° dissolve 59 parts of this salt. When the solution is exposed to the air, the acetate is partly decomposed by the absorption of carbonic acid, and carbonate of lead is precipitated; water which contains carbonic acid also decomposes acetate of lead to a certain extent; and if a current of carbonic acid gas be passed through the solution, one half of the oxide of lead is converted into carbonate and precipitated, and binacetate of lead remains in solution. It is soluble in alcohol. It renders the blue colour of violets green. The crystals fuse at 130°, and become anhydrous at 212°.

Composition.—Acetate of Lead is composed of

One equivalent	of Oxide of Lead		112	or 58·9
One „	of Acetic Acid		51	„ 26·8
Three „	of Water	9×3=	27	„ 14·3
	Equivalent		190.	100·

Formula ..... $PbO, C^4 H^3 O^3, 3HO$.

Impurities and Tests.—Acetate of Lead is seldom adulterated. It may contain traces of lime, oxide of iron, and copper. See MATERIA MEDICA: *Plumbi Acetas.*

Incompatibles, as Liquor Plumbi Diacetatis.

Pharmacopœia Preparations.—Ceratum Plumbi Acetatis, Liquor Plumbi Diacetatis, Plumbi Iodidum.

Medicinal Uses.—It is principally employed externally, in solution in water, as a collyrium in ophthalmia, an astringent in gonorrhœa, and as a wash in external inflammation. Internally it is given cautiously, and combined with opium, in protracted diarrhœa, and in pulmonary and intestinal hæmorrhage. Dose, gr. ss. to gr. j.

LIQUOR PLUMBI DIACETATIS DILUTUS.

Diluted Solution of Diacetate of Lead.

Aqua Lithargyri Acetati Composita, P.L. 1788.
Liquor Plumbi Acetatis Dilutus, P.L. 1809.
Liquor Plumbi Subacetatis Dilutus, P.L. 1809, edit. alt., P.L. 1824.
Liquor Plumbi Diacetatis Dilutus, P.L. 1836.

Take of Solution of Diacetate of Lead a fluidrachm and a half,
Distilled Water a pint,
Proof Spirit two fluidrachms;
Mix.

Medicinal Use.—Employed as an application in superficial inflammation.

PLUMBI IODIDUM.

Iodide of Lead.

Plumbi Iodidum, P.L. 1836.

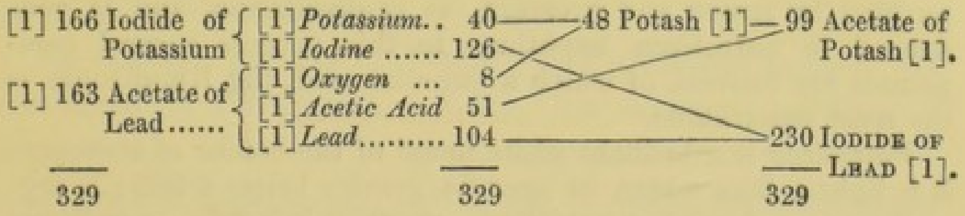
Take of Acetate of Lead eight ounces,
Iodide of Potassium seven ounces,
Distilled Water a gallon;

Dissolve the Acetate in six pints of the Water and strain; and to these add the Iodide first dissolved in two pints of the Water. Wash what is precipitated with cold distilled Water, and dry it. It is to be kept excluded from the access of light.

Pulverulent, yellow, it is dissolved in boiling water, and deposits from it when cold in brilliant yellow scales. It is melted by heat, and for the most part passes off, at first in yellow and afterwards in violet fumes. If to 100 grains dissolved by heat in boiling nitric acid diluted with twice the quantity of water, after the iodine is driven off, sulphate of soda be added, 66 grains of sulphate of lead are precipitated. The access of light to this should be prevented.

Remarks.—IODIDE OF LEAD may be formed by the direct action of iodine upon the metal, but a far more beautiful product is obtained by the above method.

Process.—When one equivalent of iodide of potassium 166, consisting of one eq. of *potassium* 40, and one eq. of *iodine* 126, is dissolved and mixed with a solution of one equivalent of anhydrous acetate of lead 163, composed of one eq. of *lead* 104, one eq. of oxygen 8, and one eq. of *acetic acid* 51, decomposition ensues; the one eq. of lead 104, combines with the one eq. of iodine 126, and forms one eq. of IODIDE OF LEAD 230; whilst the one eq. of potassium 40, unites with the one eq. of oxygen 8, to produce one eq. of potash 48, and this with the one eq. of acetic acid 51, yields one eq. of acetate of potash 99, which remains in solution.



Properties.—Iodide of Lead is of a yellow colour; it dissolves in about 1250 parts of cold water, and 200 parts of boiling water, from which, on cooling, minute shining yellow crystalline scales are deposited. It is soluble in solution of potash, forming a double salt; and is decomposed and volatilized by heat. It may be obtained in flat hexagonal crystals from its solution in iodide of potassium.

Composition.—Iodide of Lead is composed of

One equivalent of Lead..........	104	or 45·22
One „ of Iodine	126	„ 54·78
Equivalent......	230.	100·

Formula...... Pb I.

Impurities and Tests.—See Note in the text.

Pharmacopœia Preparation.—Unguentum Plumbi Iodidi.

Medicinal Uses.—In indolent swellings it has been given in doses of a quarter to half a grain; the ointment being used at the same time.

PRÆPARATA E POTASSIO.

PREPARATIONS OF POTASSIUM.

Remarks. — POTASSIUM was discovered by Sir Humphry Davy in 1807, who obtained it by subjecting slightly moistened hydrate of potash to the action of a powerful voltaic battery. Gay-Lussac and Thenard subsequently discovered that when fused hydrate of potash is brought into contact with metallic iron at a white heat, the iron is oxidized and hydrogen and potassium liberated. Modifications of this deoxidizing process are now employed to obtain this metal; for example, bitartrate of potash ignited in a closed vessel yields a carbonaceous mass containing carbonate of potash, which mixed with wood charcoal, with or without wrought iron turnings, and distilled in an iron retort at a white heat, yields an impure potassium, which is purified by fusion and pressure, or re-distillation, and is condensed in petroleum naphtha. In this process several compounds are formed, of which a peculiar acid, the Rhodizonic, is the most remarkable.

Potassium is a brilliant white metal of the colour of mercury; it is lighter than water, its specific gravity being 0·865; it crystallizes in cubes when sublimed; at 32° it is brittle, at ordinary temperatures soft, and may be squeezed between the fingers; it fuses at 150°. It sublimes at a heat below redness, yielding a green vapour, and burns in the air with a brilliant peach-coloured flame; this last phenomenon is observed when thrown into water, which it decomposes so rapidly as to ignite the hydrogen, the flame of which it tints with the peculiar pink colour before mentioned. Of all known bodies potassium has the greatest affinity for oxygen under ordinary circumstances, and is kept in rectified petroleum naphtha, a true hydrocarbon, to prevent its oxidizement. It forms compounds with hydrogen and with all the non-metallic elements, and two oxides by its union with oxygen, potash or Oxide of potassium, which will be described under Liquor Potassæ, and Teroxide of potassium, which consists of one eq. of the metal and three eqs. of oxygen; portions of this latter oxide are generally mixed with the "potassa fusa" of the shops, which by solution in water usually evolves a few bubbles of gas, which is oxygen arising from the decomposition of the teroxide of potassium. The equivalent of potassium is 40, and its symbol or formula K (*Kalium*).

LIQUOR POTASSÆ.

Solution of Potash.

Lixivium Saponarium, P.L. 1746.
Aqua Kali Puri, P.L. 1788.
Liquor Potassæ, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Carbonate of Potash fifteen ounces,
Lime eight ounces,
Distilled Water, boiling, a gallon;

Dissolve the Carbonate in half a gallon of the Water. Sprinkle a little of the Water upon the lime in an earthenware vessel, and the lime being slacked, add the rest of the Water. The liquors being immediately mixed together in a stoppered vessel, shake them frequently until they are cold. Then set aside, that the carbonate of lime may subside. Lastly, keep the poured off supernatant liquor in a well-stopped green glass bottle.

Its specific gravity is 1·063. 6·7 grains of potash are contained in 100 grains. From this solution, solution of lime being added, or if previously saturated with nitric acid, on the addition of carbonate of soda, or chloride of barium, or nitrate of silver, nothing or next to nothing is precipitated. That which is precipitated by bichloride of platinum is yellow.

Remarks.—Oxide of Potassium or POTASH is widely disseminated, existing in each of the three kingdoms of Nature, and is almost invariably a constituent of plants, and has hence been termed the *vegetable alkali*. Its chief source is from the ashes of wood, which when lixiviated and the solution boiled down to dryness, furnish the "Ashes," "Potashes" or "Pearlash" of commerce, which is chiefly imported from Canada, the Northern States of America, and from Russia.

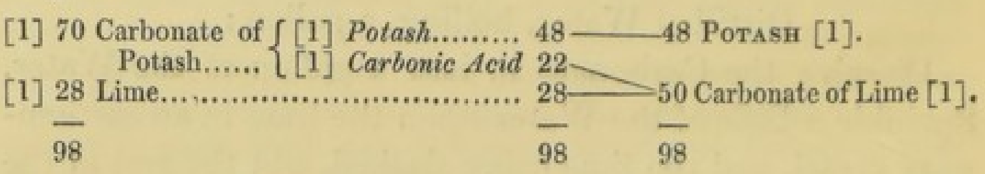
When pure, potash is a hard brittle whitish substance, fusible at a full red heat, and having a specific gravity of 2·65, or more than thrice that of its metallic base. It is composed of

One equivalent of Potassium	40	or	83·3
One „ of Oxygen	8	„	16·7
Equivalent......	48.		100·

Formula...... KO.

It will be more convenient to describe the hydrates and carbonates of potash under the next preparation.

The Process of making Liquor Potassæ is an instance of single elective affinity and decomposition. When one eq. of lime 28, is mixed with a weak boiling solution of one eq. of carbonate of potash 70, consisting of one eq. of *potash* 48, and one eq. of *carbonic acid* 22, the one eq. of carbonic acid 22, passes to the one eq. of lime 28, and forms one eq. of carbonate of lime 50, which being insoluble sinks to the bottom of the vessel; whilst the one eq. of potash 48 remains in solution, as is shown in the annexed diagram.



Excess of lime is ordered, that the potash salt may be thoroughly decarbonated.

Properties.—Solution of Potash is limpid, colourless and inodorous; its taste is extremely acrid and caustic, and when rubbed between the fingers, it feels soapy, in consequence of a partial solution of the cuticle. It should be carefully preserved from contact with the air, in order to prevent the absorption of carbonic acid; and as it is apt to act upon and destroy flint glass, the College have advantageously ordered it to be kept in green glass bottles.

Impurities and Tests.—When badly prepared, or from an impure salt, it may contain carbonate and sulphate of potash, and chloride of potassium, which the tests ordered in the text will detect.

Incompatibles.—Acids, acidulous salts, sesquicarbonate, acetate and hydrochlorate of ammonia, preparations of metals and earths held in solution by acids; chloride and bichloride of mercury.

Pharmacopœia Preparation.—Potassæ Hydras.

Pharmacopœia Use.—Oleum Æthereum.

Medicinal Uses.—Antacid, diuretic, alterative, and lithontriptic; it has also been found useful in some cutaneous diseases, as in lepra, psoriasis, &c. Dose ♏x. to f℥ss. It is recommended to give it in veal broth or in table beer: the latter is said to disguise its nauseous flavour completely, but is unfit for the purpose on account of the carbonic, and perhaps acetic, acid it may contain.

POTASSÆ HYDRAS.

Hydrate of Potash.

Lapis Infernalis sive *Septicus*, P.L. 1721.
Kali Purum, P.L. 1788.
Potassa Fusa, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Solution of Potash a gallon;

Evaporate the water in a clean iron vessel over the fire, until, the ebullition being finished, the Hydrate of Potash liquefies; pour this into proper moulds.

It rapidly deliquesces in an open vessel. It is dissolved in rectified spirit.

Remarks.—Potash combines with one, three, and five equivalents of water respectively to one eq. of the alkali; of which the first or monohydrate is the Potassæ Hydras of the Pharmacopœia and the only hydrate of importance. It forms soluble salts with all the acids, and its aqueous solution dissolves several of the metallic oxides. The characteristic tests of potash are, that its salts give a peach-coloured tint to the blow-pipe flame, and their solutions, unless very weak, yield crystalline precipitates with excess of tartaric and perchloric acids, with an alcoholic solution of carbazotic acid, and a yellow precipitate with an alcoholic solution of chloride of platinum.

Properties.—Hydrate of Potash is a compound of potash and water; when pure it is white, hard and brittle, but as usually prepared for medicinal purposes, it contains the various slight impurities of the solution, and frequently peroxide of iron, acquired during evaporation. It is often of a brownish and sometimes of a bluish tint, is extremely caustic, and very deliquescent, attracting water and carbonic acid from the atmosphere; water dissolves nearly twice its weight of it, and during solution heat is extricated. It possesses in the strongest degree the properties denominated alkaline.

Hydrate of potash melts when exposed to a low red heat; but so great is the affinity existing between the potash and the water, that although they may be volatilized together at a white heat, the water cannot be separated by it. During the preparation of the hydrate of potash a portion of the potash becomes teroxide of potassium; but the additional oxygen thus acquired may be expelled in the gaseous state, by subsequent solution in water. Its specific gravity is 1·706, and it possesses a crystalline structure.

Composition.—This preparation consists of

One equivalent of Potash	48	or 84·2
One ,, of Water	9	,, 15·8
Equivalent.	57.	100·

Formula. . . . . . KO, HO.

Adulterations, Impurities, and Tests.—Nitrate of potash is used to adulterate this preparation; when mixed with excess of sulphuric acid, nitrous fumes will be given off if this salt be present. The impurities it usually contains are peroxide of iron, carbonate and sulphate of potash, chloride and teroxide of potassium, silica, alumina and lime, or its carbonate. The first and last are insoluble in water, the salts may be detected by the tests ordered in the text under Liquor Potassæ; teroxide of potassium evolves oxygen when the hydrate is treated with water; silica may be detected by saturating the clear solution of potash with hydrochloric acid, evaporating to dryness, and re-dissolving the salt in water, when the silica remains behind insoluble, and if alumina be present, ammonia added to this solution of the chloride will produce a white gelatinous precipitate. Its solution should not be coloured on the addition of hydrosulphuric acid. These impurities, however, but slightly impair its medicinal uses.

Incompatibles.—As Liquor Potassæ.

Pharmacopœia Preparation.—Potassa cum Calce.

Medicinal Uses.—Potassæ Hydras is used only externally as a caustic; excepting for particular purposes, the Argenti Nitras is generally preferred; for, on account of the deliquescent property of the hydrate of potash, it is difficult to confine its action within the requisite limits.

POTASSA CUM CALCE.

Potash with Lime.

Causticum Commune Fortius, P.L. 1746.
Calx cum Kali Puro, P.L. 1788.
Potassa cum Calce, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Hydrate of Potash,
Lime, each an ounce;

Rub them together and keep them in a well-stopped vessel.

It is slaked when sprinkled with water. It evolves no bubbles of carbonic acid, on any acid being added to it.

Remarks.—The method of using this is to mix it into a paste with a little spirit of wine, and apply it to the part to be cauterized.

POTASSÆ ACETAS.

Acetate of Potash.

Sal Diureticus, P.L. 1746.
Kali Acetatum, P.L. 1788.
Potassæ Acetas, P.L. 1809, P.L. 1824, P.L. 1836.

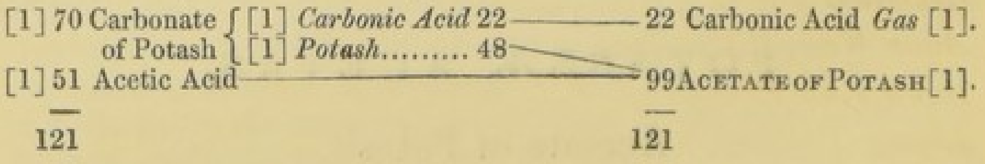
Take of Acetic Acid twenty-six fluidounces,
Carbonate of Potash a pound, or as much as may be sufficient,
Distilled Water twelve fluidounces;

To the Acid mixed with the water, gradually add the Carbonate to saturation, then strain. Evaporate the solution in a sand-bath, the heat being cautiously applied, until the salt is dried.

It is dissolved in rectified spirit and in water. The aqueous solution stains neither litmus nor turmeric. Nitrate of silver or chloride of barium being added, nothing is precipitated from it. If however from a stronger solution anything is precipitated by nitrate of silver, it is redissolved, dilute nitric acid or water being added. The addition of Sulphuric Acid liberates acetic fumes. From 100 grains of it digested with Sulphuric Acid, when the solution is evaporated and the salt dried in a strong fire, there remain 88·8 grains of sulphate of potash.

Remarks.—Acetic Acid has been already described, page 48, and although in some cases carbonic acid would appear to have the power of decomposing the acetates, yet acetic acid will always decompose a carbonate unless prevented by the state of aggregation, &c., and invariably so if the carbonate, like that of potash, is soluble in water.

Process.—This, like the process of Liquor Potassæ, is one of single elective affinity and decomposition, only in this case the carbonic acid is evolved as gas, instead of forming an insoluble salt with a base, and a soluble salt is the result; referring to the statement under that preparation, I shall only subjoin a diagram of the changes which take place:



Properties.—Acetate of Potash thus obtained is a colourless pulverulent salt; it is nearly inodorous, and has a pungent saline taste; it is extremely deliquescent, very soluble in water, and in alcohol, which latter solution is decomposed by a current of carbonic acid gas; it is decomposed by heat and converted into carbonate of potash. As usually prepared it has a foliated appearance, which is given to it by fusion and cooling; in this operation, however, unless very carefully conducted, and by some one acquainted with the mode of performing it, the acetate is liable to be decomposed; in this fused state it is vulgarly termed "foliated tartar*."

Composition.—Anhydrous Acetate of Potash consists of

One equivalent of Potash	48	,,	48·5
One ,, of Acetic Acid	51	or	51·5
Equivalent......	99.		100·

Formula...... $KO, C^4 H^3 O^3$.

Impurities and Tests.—See Note in the text. It is not liable to adulteration.

Incompatibles.—It is decomposed by the sulphuric, nitric, and hydrochloric acids, acetic acid being expelled. It is also decomposed by sulphate of soda and sulphate of magnesia, and by several other earthy and metallic salts.

Medicinal Uses.—In small doses it is diuretic, and in larger ones mildly cathartic. Dose as a diuretic from ℈j. to ʒj.; as a cathartic from ʒij. to ʒiij. As it is deliquescent, it must be exhibited in solution.

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* According to my analysis, the fused acetate of potash of commerce contains one eq. of water, its formula being $KO, C^4 H^3 O^3, HO$.—ED.

LIQUOR POTASSÆ CARBONATIS.

Solution of Carbonate of Potash.

Liquamen Tartari seu *Oleum Tartari per Deliquium*, P.L. 1721.
Lixivium Tartari, P.L. 1746.
Aqua Kali, P.L. 1788.
Aqua Kali Præparati, P.L. 1788, edit. alt.
Liquor Potassæ Subcarbonatis, P.L. 1809, P.L. 1824.
Liquor Potassæ Carbonatis, P.L. 1836.

Take of Carbonate of Potash twenty ounces,
Distilled Water a pint;
Dissolve, and strain.
The specific gravity of this solution is 1·473.

Remarks.—This solution is colourless, inodorous, and possesses the other properties hereafter mentioned. Dose, from ♏x. to f℥j.

Carbonate of Potash, as already stated, is chiefly derived from the lixiviation of wood-ashes, and in its crude state often contains, besides insoluble impurities, chloride of potassium, sulphate, silicate, phosphate, and manganate of potash, and carbonate of soda; from some little of these soluble impurities it is seldom free, unless prepared from the bicarbonate of potash by ignition. Charcoal powder is stated to deprive this salt of all the silica a solution of it may contain. Carbonate of potash is now transferred to Materia Medica; the process directed in the last Pharmacopœia to obtain this salt was simply solution in cold water of the crude carbonate, and evaporating the clear solution to dryness, or as above-mentioned, by igniting the bicarbonate of this alkali.

Properties.—When obtained by evaporating its solution to dryness, the Potassæ Carbonas of the Pharmacopœia, this salt occurs as a coarse arenaceous crystalline powder; it is colourless and inodorous; its taste is strong and disagreeable; it does not readily crystallize, but may be obtained in rhombic octohedrons containing two eqs. of water; it is never kept in crystals; it is deliquescent, attracting in a short time enough water from the atmosphere to become liquid; water dissolves rather more than an equal weight of it, and any residue may be considered as impurity. The solution turns vegetable blues green, and yellows brown; it is insoluble in alcohol. When heated to redness it loses about 16 per cent. of water, and fuses; its specific gravity is then 2·24. It is decomposed at a red heat by the vapour of water, hydrate of potash being formed and carbonic acid expelled. At a white heat it volatilizes.

Composition.—The anhydrous salt is composed of

One equivalent of Potash	48	or 68·57
One „ of Carbonic Acid	22	„ 31·43
Equivalent......	70.	100·

Formula...... KO, CO^2.

The salt of the Materia Medica is a sesquihydrate, consisting of

One equivalent of Carbonate of Potash ..	70·0	or 84
One and a half equivalent of Water	13·5	„ 16
Equivalent......	83·5.	100.

As this salt contains one equivalent of its constituent acid and base, its proper appellation is carbonate of potash, given it by the College: it was formerly called *subcarbonate* of potash, because it not only acts like an alkali in rendering vegetable yellows brown, and blues green, but on account of its power of combining with an additional quantity of carbonic acid, and forming bicarbonate of potash described below.

Impurities and Tests.—See above, and also MATERIA MEDICA: *Potassæ Carbonas.*

Incompatibles.—Acids and acidulous salts, acetate of ammonia, alum, chloride of barium, chloride of calcium, hydrochlorate of ammonia, lime-water, sulphate of magnesia, and most other salts, whether alkaline, earthy, or metallic.

Pharmacopœia Preparations.—Decoctum Aloes Compositum, Enema Aloes, Liquor Potassæ, Liquor Potassæ Arsenitis, Liquor Potassæ Carbonatis, Mistura Ferri Composita, Potassæ Acetas.

Pharmacopœia Uses.—Spiritus Ammoniæ Aromaticus, Spiritus Ammoniæ Fœtidus.

Medicinal Uses.—Antacid and diuretic. Dose, from gr. x. to gr. xx.

BICARBONATE OF POTASH is now transferred to Materia Medica, and is met with in commerce in a state of great purity. I subjoin the mode of preparing it inserted in the last Pharmacopœia.

POTASSÆ BICARBONAS, P.L. 1836.

Bicarbonate of Potash.

Potassæ Carbonas, P.L. 1809, P.L. 1824.

Take of Carbonate of Potash six pounds,
Distilled Water a gallon;

Dissolve the Carbonate of Potash in the Water; afterwards pass Carbonic Acid through the solution to saturation. Apply a gentle heat, so that whatever crystals have been formed may be redissolved. Then set aside [the solution] that crystals may be again produced; the liquor being poured off, dry them.

Carbonic Acid is very easily obtained from Chalk rubbed to powder and mixed with water to the consistence of a syrup, upon which Sulphuric Acid is then poured diluted with an equal weight of Water.

Remarks.—Carbonate of Potash is capable of combining with another equivalent of carbonic acid, and thus to form Bicarbonate of potash, which is the object of this process.

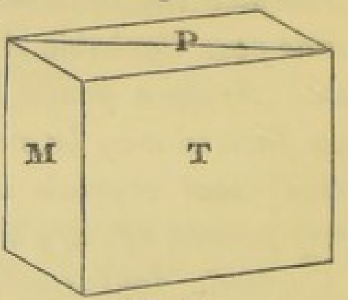
Process.—Chalk, or carbonate of lime, is composed of one eq. of *carbonic acid* 22, and one eq. of *lime* 28, and when this is decomposed by one eq. of sulphuric acid 40, diluted with water, one eq. of carbonic acid 22 is liberated, and this combining with one eq. of carbonate of potash 70, and one eq. of water 9, forms one eq. of crystallized bicarbonate of potash 101.

[1] 22 Carbonic Acid Gas
[1] 70 Carbonate of Potash ——— 101 Bicarbonate of Potash[1].
[1] 9 Water
101 101

Properties.—This salt is inodorous, colourless, and crystalline. When properly prepared it has scarcely any alkaline taste, and acts but slightly, if at all, upon turmeric paper. It suffers no change by exposure to the air. It requires four times its weight of water at 60° for solution; by boiling water it is partially decomposed, and rendered more soluble by the loss of carbonic acid. It is insoluble in alcohol. When exposed to a low red heat it loses half its carbonic acid, the whole of its water of crystallization, and returns to the state of carbonate; and this is the method of procuring the latter in a state of purity formerly recommended by the College, as already seen.

The primary form of this substance is *a right oblique-angled prism*, which is not readily traced in the secondary crystals, but may be derived from cleavage, and is shown in fig. 1. There is also a cleavage parallel to a plane passing through the diagonal marked on the terminal planes.

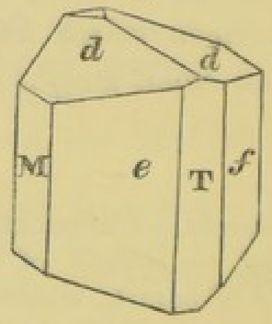
Fig. 1.



P on M, or T........	90° 00′
M on the diagonal plane	53 15
M on T.............	103 25

The planes which appear on the crystals are represented in fig. 2; but the planes *e* are sometimes very disproportionately extended, so as nearly to efface T and *f*, giving to the crystals the character of another primary form.

Fig. 2.



The planes T do not commonly occur on the crystals, and without these they nearly resemble a secondary form of the *right rhombic prism*; they may, however, be distinguished by the unequal inclination of M on the two adjacent planes. On cleaving or otherwise breaking the crystal, water may be observed between the laminæ, which probably occasions the measurement on the cleavage planes not accurately to agree. This is also the case with many other of the factitious salts.

M on plane parallel to *f*............	127° 35′
M on *e*.........................	126 45
T on *e*.........................	156 50
T on *f*.........................	128 50
e on *f*	105 40
M on *d*.........................	111 00
d on *d′*.......................	138 00

Composition.—This salt consists of

One equivalent of Potash	48	or 47·53
Two ,, of Carbonic Acid....	22×2=44	,, 43·56
One ,, of Water	9	,, 8·91
Equivalent......	101.	100·

Formula.... $KO, 2CO^2, HO$.

Impurities and Tests.—See MATERIA MEDICA: *Potassæ Bicarbonas.*

Incompatibles.—These are nearly the same as enumerated when treating of carbonate of potash. It does not, however, produce any precipitate in a solution of sulphate of magnesia.

Medicinal Uses.—In cases where an alkali is indicated, this preparation offers an agreeable and efficient remedy; and experience has shown that its additional proportion of carbonic acid does not in the least invalidate its alkaline agency. Dose, grs. x. to grs. xxx.

SULPHURET OF POTASSIUM is now transferred to Materia Medica, but as carbonate of potash is used in its preparation, I shall here insert the directions of the last Pharmacopœia for preparing

POTASSII SULPHURETUM, P.L. 1836.

Sulphuret of Potassium.

Hepar Sulphuris, P.L. 1721.
Kali Sulphuratum, P.L. 1788.
Potassæ Sulphuretum, P.L. 1809, P.L. 1824.

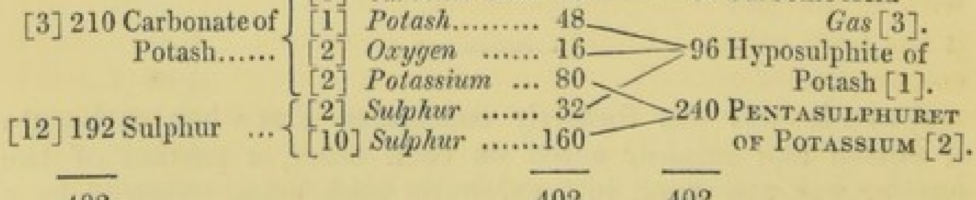
Take of Sulphur an ounce,
Carbonate of Potash four ounces;
Rub them together, and place them upon the fire in a covered crucible, until they have united.

Remarks.—It was formerly considered that when carbonate of potash and sulphur acted on each other, a portion of the sulphur was converted into sulphuric acid, being oxidized by a portion of the oxygen of the potash, and that consequently upon the mutual action of four equivalents of sulphur and four equivalents of carbonate of potash, there resulted three equivalents of sulphuret of potassium, and one equivalent of sulphate of potash. The recent researches of MM. Fordos and Gelis show this view to be unfounded, and that when the whole of the sulphuret of potassium of this compound is dissolved by treating it with alcohol, not a trace of sulphate of potash remains in the residual salt, this being hyposulphite mixed with undecomposed carbonate of potash; this last salt being completely decomposed only when about equal weights of it and sulphur are employed; by using less sulphur a persulphuret of potassium is obtained mixed with hyposulphite and carbonate of potash, but never with the sulphate of that alkali.

From the preceding remarks, it will be seen that the sulphuret of potassium of the Pharmacopœia is not a definite compound, but that it consists of a mixture of a persulphuret of potassium, and hyposulphite, and carbonate of potash. To effect this combination a very moderate heat is sufficient; if, however, the mixture be heated to redness, then undoubtedly sulphate of potash is formed, as the hyposulphite of this alkali is then decomposed into sulphuret of potassium and sulphate of potash.

It is evident from the directions above given, that it was not intended to ignite the mixture of sulphur and salt, but merely to employ sufficient heat to cause them to unite.

Process.—When three equivalents of carbonate of potash 210, consisting of two eqs. of *potassium* 80, two eqs. of *oxygen* 16, one eq. of *potash* 48, and three eqs of *carbonic acid* 66, are heated with twelve eqs. of sulphur 192, the following changes take place; the three eqs. of carbonic acid 66, are expelled, and ten eqs. of the sulphur 160, unite with the two eqs. of potassium 80, to form two eqs. of pentasulphuret of potassium 240; whilst the two remaining eqs. of sulphur 32, uniting with the two eqs. of oxygen 16, form one eq. of hyposulphurous acid 48, which in combination with the one eq. of potash 48, produces one eq. of hyposulphite of potash 96, which intermixed with the two eqs. of pentasulphuret of potassium and the excess of undecomposed carbonate of potash together form the Potassii Sulphuretum of the Pharmacopœia, as shown in the subjoined diagram in which the excess of carbonate of potash is omitted.



Properties.—This substance is hard; it is of a liver-brown colour, and hence its ancient name Hepar Sulphuris. It is inodorous while dry, but when moistened it emits a smell of hydrosulphuric acid; it dissolves readily in water yielding a yellow solution. Its taste is acrid and bitter. By exposure to air this preparation is soon spoiled; both the sulphur and potassium attracting oxygen from the air, it becomes inodorous, white, and totally unfit for use.

Incompatibles.—This compound is decomposed by acids, which expel hydrosulphuric acid and precipitate sulphur. It is decomposed also by solutions of most of the metals, which, uniting with the sulphur, are precipitated in the state of sulphuret.

Medicinal Uses.—It is principally used externally in cutaneous diseases, and has been recommended as a lotion for the itch in infants, and is stated to have succeeded after the sulphur ointment has failed. It is rarely used internally.

LIQUOR POTASSII IODIDI COMPOSITUS.

Compound Solution of Iodide of Potassium.

Liquor Potassii Iodidi Compositus, P.L. 1836.

Take of Iodide of Potassium ten grains,
Iodine five grains,
Distilled Water a pint;
Mix, that they may be dissolved.

Remarks.—In this mixture the iodide of potassium, by uniting with an additional portion of iodine, renders it soluble in water; it has been called *ioduretted iodide of potassium.* It is a brown-coloured solution, and has the peculiar smell and taste of iodine, and exerts the characteristic reaction of this element on starch.

Medicinal Uses.—This is a mode of exhibiting iodine, which has been found very serviceable in dispersing some forms of bronchocele. Dose, from fʒss. to f℥ss.; but its effects varying on different constitutions, its exhibition requires the exercise of great judgement.

It having been transferred to Materia Medica, I here insert the former method of making

POTASSII IODIDUM, P.L. 1836.

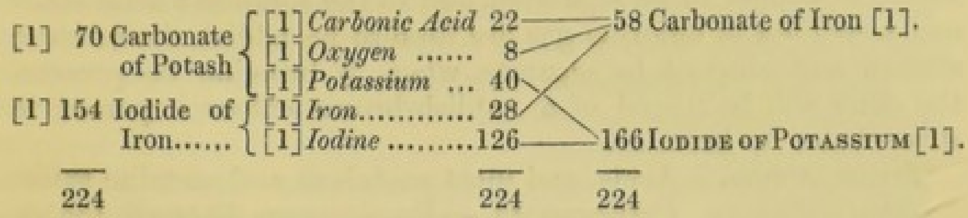
Iodide of Potassium.

Take of Iodine six ounces,
Carbonate of Potash four ounces,
Iron Filings two ounces,
Distilled Water six pints ;

Mix the Iodine with four pints of the Water, and add the Iron, stirring them frequently with a spatula for half an hour. Apply a gentle heat, and when a greenish colour occurs, add the Carbonate of Potash, first dissolved in the two pints of Water, and strain. Wash what remains with two pints of boiling distilled water, and again strain. Let the mixed liquors be evaporated, so that crystals may be formed.

Remarks.—There are few compounds to prepare which in a state of purity and without waste so many processes have been devised as for iodide of potassium ; besides the above, antimony, zinc, potassium, calcium and barium, have been recommended either in the metallic or some combined state, to act an intermediate part in different processes in lieu of the metallic iron above directed, whilst the direct action of hydriodic acid prepared in various ways, and of iodine upon potash, or its carbonate, have also been employed, variously modified, by different chemists ; of all these the one already detailed, and the direct action of iodine on well prepared solution of potash, evaporating the solution to dryness and igniting the residual salt with a little charcoal powder to decompose the *iodate of potash* formed, dissolving out and crystallizing the iodide of potassium, appear to be the best and most manageable.

Process.—The first step of this process is to make an iodide of iron, which has been already described under Syrupus Ferri Iodidi ; whilst the second is to convert the iodide of iron into iodide of potassium, which is thus effected. One equivalent of iodide of iron 154, consists of one eq. of *iron* 28, and one eq. of *iodine* 126 ; when this is added to a solution of one equivalent of carbonate of potash 70, consisting of one eq. of *potassium* 40, one eq. of *oxygen* 8, and one eq. of *carbonic acid* 22, these constituents are interchanged, the one eq. of iron 28, combines with the one eq. of oxygen 8, forming one eq. of oxide of iron 36, and this with the addition of the one eq. of carbonic acid 22, forms one eq. of carbonate of iron 58, whilst the one eq. of potassium 40, uniting with the one eq. of iodine 126, yields one eq. of iodide of potassium 166, which crystallizes out on concentrating the solution after the separation of the carbonate of iron. This will be readily understood from the subjoined diagram.



Properties.—Iodide of Potassium is colourless, inodorous, crystallizes in cubes, which contain no water, it has a penetrating taste. 100 parts of water at 65° dissolve 143 parts of this salt; it is sparingly soluble in absolute alcohol, but more so in that which contains water. It fuses at a red heat, and at a high temperature is volatilized, without suffering decomposition. It is decomposed by chlorine and by nitric acid, iodine being liberated.

Iodide of potassium sometimes occurs in octohedral crystals, but this is due to some impurity, as a trace of free iodine. Its specific gravity is about 3·00. It forms a vast number of double salts, of which the iodo-cyanide of mercury and potassium inserted in the Appendix is an example. It is decomposed when heated or fused with various metallic acids, phosphoric, silicic and boracic acids, by the sesquisalts of iron and other metallic salts.

Composition.—This salt is composed of

One equivalent of Potassium........	40	or 24
One „ of Iodine	126	„ 76
Equivalent....	166.	100·

Formula.....KI.

Adulterations, Impurities, and Tests.—The value, the ease with which it is simulated, and the facility with which it combines with other salts, render iodide of potassium peculiarly liable to adulteration; for this purpose the chlorides of potassium and of sodium, carbonate of potash, bromide of potassium and nitrate of soda have been employed; and all of these, excepting the last, at times exist in this salt as impurities, as well as iodate of potash, free iodine, potash, a salt of lead or tin, seleniate of potash, sulphates of potash, lime, &c. To detect the presence of these salts the tests ordered in MATERIA MEDICA, *Potassii Iodidum*, are generally sufficient, to which I may add non-colouration of the solution by hydrosulphuric acid, showing the absence of metallic impurity, non-precipitation by lime-water, or chloride of calcium proving the absence of carbonate of potash: a slight turbidness produced in the lime solution need not be noticed if the salt be for medicinal use. To detect the presence of bromine, Personne recommends the suspected salt to be treated with excess of sulphate of copper and then with sulphurous acid gas, the insoluble iodide of copper to be separated, and to the solution a little ether and a solution of chlorine gas are then to be added, the mixture shaken and allowed to separate, when, if bromine be present, the ether will be tinged of a reddish-brown colour imparted to this solvent by bromine.

Incompatibles.—Acids, and most acidulous and metallic salts.

Pharmacopœia Preparations.—Emplastrum Potassii Iodidi, Liquor Potassii Iodidi Compositus, Tinctura Iodinii Composita, Unguentum Iodinii Compositum, Unguentum Potassii Iodidi.

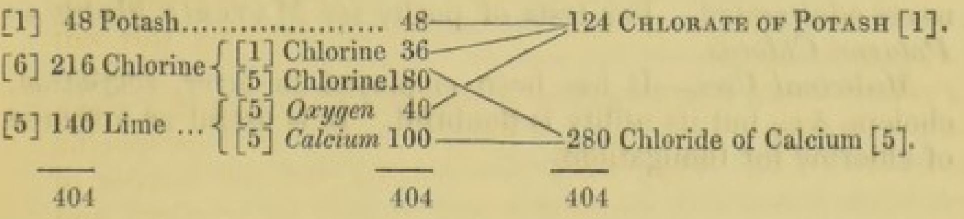
Pharmacopœia Use.—Plumbi Iodidum.

Medicinal Uses.—This is a most valuable medicine in various forms of the secondary symptoms of syphilis. Dose, from gr. v. to gr. x. two or three times a day; the action of this salt on the system is however too uncertain for any exact quantity to be inserted in this work.

Chlorate of Potash occurs in Materia Medica, but is not employed in any of the preparations of the Pharmacopœia. I shall consider its nature and properties under this section, and, as no formula has been ordered, either in the present or former Pharmacopœias, for obtaining it, append an advantageous process for procuring this salt founded on the method described by Mr. Crace-Calvert, by which the product of chlorate is greatly increased when compared with the modes of obtaining this salt previously in vogue.

Process.—Boil down a gallon of Solution of Potash in a clean iron vessel to five pints and five fluidounces, or until its specific gravity is 1·110. Then slack two pounds and ten ounces of fresh burnt Lime with as much water as may be required, and add it to the clear concentrated solution of potash. Mix seven pounds of Chloride of Sodium, with five pounds and four ounces of Binoxide of Manganese, both reduced to powder, and put them into a retort, together with four pints of Sulphuric Acid diluted with five pints of Water, and the mixture cooled previously to adding it to the chloride and binoxide. Heat the mixture contained in the retort, and pass the chlorine gas thus obtained first, through half a pint of water, and afterwards into the mixture of potash and lime, previously warmed, until it absorbs no more gas. Should this alkaline mixture be capable of absorbing more chlorine gas than is liberated from the mixture in the retort, a further quantity of the binoxide, chloride, sulphuric acid and water must be employed until the lime and potash mixture is thoroughly saturated with the gas. Then evaporate the chlorinated mixture nearly to dryness, exhaust the residue with boiling distilled water, evaporate the clear solution, and set aside that crystals may be formed. Lastly, redissolve these in boiling water and recrystallize the solution to purify the chlorate of potash.

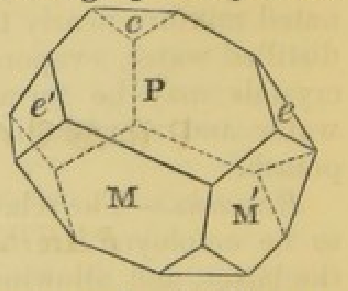
Remarks.—The relative proportions of lime and potash ordered to be employed are about five eqs. of the former to one eq. of the latter, and allowing for some impurity and moisture in the binoxide and chloride, these, with the sulphuric acid, are used in such proportions that they will furnish six eqs. of chlorine gas being an equal number of equivalents to those of the combined potash and lime. I shall defer the explanation of the changes which occur in the production of chlorine gas by this method, until I come to treat of LIQUOR SODÆ CHLORINATÆ, and confine myself to the action of the chlorine on the mixture of potash and lime. When six equivalents of chlorine 216, are brought into contact with five eqs. of lime 140, consisting of five eqs. of *calcium* 100, and five eqs. of *oxygen* 40, mixed with so much of a solution of potash containing rather more than ten per cent. of alkali, as is equal to one equivalent of potash 48, the following changes take place; five eqs. of chlorine 180, unite with the five eqs. of calcium 100, and form five eqs. of chloride of calcium 280, whilst the remaining one eq. of chlorine 36, combines with the five eqs. of oxygen 40, to form one eq. of chloric acid 76, which with the one eq. of potash 48, yields one eq. of CHLORATE OF POTASH 124. These reactions will be illustrated by the annexed diagram:—



Remarking upon this process, Mr. Crace-Calvert observes, "This, so far as I am aware, is the only example chemistry affords, where, in the presence of two bases, the chlorine applies itself almost *entirely* to one of the two metals, whilst oxygen applies itself to the chlorine, converting it into an acid which neutralizes the second base, namely the potash."

Properties.—Chlorate of Potash is a colourless, inodorous, crystalline salt which occurs in rhomboidal nacreous tables; its taste resembles that of nitrate of potash. Its primary form is an oblique rhombic prism. The cleavage parallel to the planes M and M′ is easy, and the cleavage planes brilliant, but the crystals are usually too thin to obtain a cleavage plane parallel to P. The measurements are as follows:—

P on M, or M′	105° 30′
M on M	104 0
P on C	106 45
P on *e* or *e*′	129 45



100 parts of water at 60° dissolve 6 parts, and a boiling saturated solution at 216° takes up 60 per cent. of this salt; it is anhydrous, fuses at somewhat above 400°, and evolves oxygen gas when the heat is increased beyond 600°, the residuum being chloride of potassium. It detonates sharply, and dangerously if rubbed or struck when mixed with inflammable substances, such as phosphorus and sulphur, and is phosphorescent when triturated by itself in the dark. Hydrochloric and sulphuric acids decompose this salt with the evolution of chlorine gas associated with some of the oxides of chlorine. Its specific gravity is 1·989. It is an elegant and ready source of oxygen gas; its chief use however is in the manufacture of *lucifer matches*.

Composition.—Chlorate of Potash consists of

One equivalent of Potash	48	or 38·7
One „ of Chloric Acid	76	„ 61·3
Equivalent	124	100·

Formula...... KO, ClO^5.

Impurities, Adulterations, and Tests.—This salt is seldom or never adulterated. For tests of purity see MATERIA MEDICA: *Potassæ Chloras.*

Medicinal Uses.—It has been employed in fever, scarlatina, cholera, &c., but its utility is doubtful. It is useful as a source of chlorine for fumigations.

PRÆPARATA E SODIO.

PREPARATIONS OF SODA.

Remarks.—Sodium, although existing like potassium in many organized structures, yet is met with in the largest proportion in, and its numerous compounds employed in medicine and the arts are exclusively derived from, the inorganic kingdom, in which it exists as chloride of sodium; which occurs as a solid rock, in springs, then termed *brine-springs*, and in sea-water. These three sources are the origin of all the common salt and most of the preparations of soda so extensively employed in this kingdom.

It has been already stated that Davy discovered potassium in 1807, and showed that potash was its oxide. In the same year he also proved that soda is the oxide of a metal which he named Sodium, very similar in many of its properties to potassium, and which may be procured from soda by processes analogous to those used for obtaining potassium, than which however it is more readily and certainly procured.

Sodium is a brilliant white metal; it is soft and malleable; it tarnishes rapidly by exposure to moist air, owing to oxidizement. Its specific gravity is 0·972. It does not become brittle at 32°; it softens at 122°, fuses at about 190°, and at a white heat it is volatilized, yielding a colourless vapour, which burns with a yellow flame when heated in contact with oxygen, and is converted into soda or oxide of sodium. Under particular circumstances it decomposes water with combustion, as potassium does, but in general the action is accompanied merely by a hissing noise.

Sodium, like potassium, forms two compounds with oxygen; these are *Oxide of Sodium* or *Soda*, composed of

One equivalent of Sodium	24	or 75
One „ of Oxygen	8	„ 25
Equivalent......	32.	100.

Formula...... NaO.

and *Peroxide of Sodium*, the composition of which is not as yet exactly determined.

LIQUOR SODÆ.

Solution of Soda.

Take of Carbonate of Soda thirty-one ounces,
Lime nine ounces,
Distilled Water, boiling, a gallon ;

Prepare the Solution in the same manner by which Solution of Potash is directed to be made.

Its specific gravity is 1·061. Four grains of Soda are contained in 100 grains. This solution agrees with what has been before observed respecting the properties of Solution of Potash, excepting the last characteristic.

Remarks.—Soda resembles potash in many of its properties, it is however less fusible and volatile than the latter. It combines with water to form a hydrate which is not decomposable by heat, fuses at a red heat, is very soluble in water and in alcohol, is very deliquescent, and may be obtained from its solution in quadrangular crystals. It consists of

One equivalent of Soda	32	or	78·1
One „ of Water..........	9	„	21·9
Equivalent......	41.		100·

Formula...... NaO, HO.

Soda combines and forms definite salts with the acids; these however are for the most part decomposed by potash, than which it is a weaker alkali.

Process.—The reaction in this being precisely similar to that which occurs in the preparation of Liquor Potassæ, I shall content myself with referring to that process.

Impurities, Adulterations, and Tests.—Solution of Soda is not likely to be purposely adulterated ; any usual impurities may be discovered by the tests referred to in the text. The characteristic tests of soda are that when carbonate of soda is added to a solution of any inorganic body, and no precipitate nor ammoniacal fumes are produced, nor any precipitate on the addition of tartaric acid in excess, or bichloride of platinum, the substance under examination must be a salt of soda. Its salts tinge the blowpipe flame a dusky yellow, and yield precipitates with antimoniate of potash.

Pharmacopœia Preparation.—Antimonii Oxysulphuretum.

Medicinal Uses.—As solution of potash.

SODÆ CARBONAS EXSICCATA.

Dried Carbonate of Soda.

Sodæ Subcarbonas Exsiccata, P.L. 1809, P.L. 1824.
Sodæ Carbonas Exsiccata, P.L. 1836.

Take of Carbonate of Soda a pound;

Apply heat to the Carbonate, until the crystals fall to powder, and afterwards heat it to redness. Lastly, rub it to powder.

It is dissolved in water. Dilute sulphuric acid being added to 100 grains of this, they evolve 40·7 grains of carbonic acid.

Process.—The greater part of the water which crystallized carbonate of soda contains, is first expelled by a moderate degree of heat, and the total expulsion is effected by ignition; the heat is applied gently at first, because the fused salt, if strongly heated, would boil over, and the ignition is requisite to thoroughly dry it and to render the preparation of uniform strength.

Composition.—It consists of

One equivalent of Soda	32	or 59·3
One ,, of Carbonic Acid ..	22	,, 40·7
Equivalent......	54.	100·

Formula...... NaO, CO^2.

Medicinal Use.—In this dry state, carbonate of soda may be exhibited in the form of powder mixed with other medicines. Dose, gr. v. to gr. xv.

I subjoin the method directed in the last Pharmacopœia for preparing purified carbonate of soda in crystals.

SODÆ CARBONAS, P.L. 1836.

Carbonate of Soda.

Natron Præparatum, P.L. 1788.
Sodæ Subcarbonas, P.L. 1809, P.L. 1824.

Take of Impure Carbonate of Soda two pounds,
Distilled Water four pints;

Boil the impure Carbonate of Soda in the Water, and strain it while hot. Lastly, set it by that crystals may be formed.

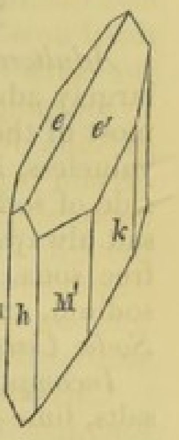
Process.—Carbonate of Soda is a compound of carbonic acid and the alkali soda; this substance has been long known as the *fossil* or *mineral alkali* or *natron*; it occurs in various parts of the earth in the state of a peculiar carbonate. It is also obtained by burning certain plants and sea-weed. The impure carbonate of soda formerly employed was *barilla*, procured by burning certain plants in Spain; there is, however, now prepared, by decomposing common salt, as noticed hereafter, a much preferable, though still not quite pure, carbonate of soda. When this is dissolved in hot water to saturation, crystals are deposited, as the solution cools, which are carbonate of soda. As a rule, the smaller the crystals the purer the salt.

Carbonate of soda is made in enormous quantities in this kingdom by decomposing common salt, chloride of sodium, by sulphuric acid, see Acidum Sulphuricum Dilutum, p. 72, evaporated in leaden boilers to about 1·60, which is the greatest specific gravity attainable without injuring the leaden boilers. The salt is thrown into a reverberating furnace, and sufficient sulphuric acid is poured upon it to convert it into sulphate of soda, which when roasted, until the hydrochloric acid is expelled, forms anhydrous sulphate of soda or *salt-cake*. In p. 52 *et seq.* of this work the changes which occur in this stage of the process are explained. This salt-cake is coarsely ground together with a quantity of chalk or lime, and coal-dust, and again roasted in a more powerful reverberatory furnace, where the mixture undergoes several complicated reactions, and ultimately fuses into a pasty mass, which emits numerous jets of flame: this is rapidly stirred by the workman, who when he perceives that the jets of flame assume a peculiar tint, "draws his furnace" into moulds or iron barrows. This mass, termed *black-ash*, is a most complex mixture, containing besides numerous salts of calcium and of sodium, soda and its carbonate in large quantity; the sulphate of soda or salt-cake being, for the most part, deprived of its sulphur and oxygen by the lime and coal, giving rise to free soda and the carbonate of this alkali. This black-ash exhausted by water, and the solution evaporated to dryness and roasted with free access of air, either with or without the addition of charcoal or of sawdust, furnishes the *soda-ash* or *white-ash* of commerce, now so largely employed in making soap, glass, &c. Crystallized carbonate of soda is procured either directly from the solution of black-ash, or by redissolving and crystallizing white-ash: in either case it should be crystallized a second time, and then the crystals are the Sodæ Carbonas of Materia Medica, which though pure enough for ordinary purposes, yet usually requires several recrystallizations before it is obtained chemically pure. Numerous other methods have been invented to obtain this salt, none of which have proved, in all respects, so certain, efficient, and economical as the process above described.

Properties.—The crystals of this salt are frequently very large, and are obtained for various uses in a state of considerable purity; the primary form of the crystal appears to be an *oblique rhombic prism*.

This figure represents the ordinary shape of the crystals.

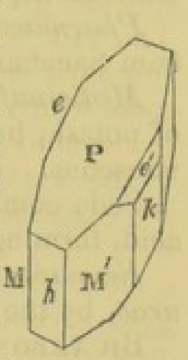
Fig. 1.



P on M, or M′	108° 43′
P on *e*, or *e*′	129 52
P on *h*	121 20
M on M	76 12
M on *h*	128 6
M on *k*	141 54
e on *e*′	79 44
e on *k*	143 8

The crystals represented by fig. 2. are reduced in height, and so thin as to leave scarcely a vestige of the planes M and *h*, and several are hemitropes, the plane of imaginary section being parallel to P.

Fig. 2.



Carbonate of Soda is colourless and inodorous; its taste is alkaline and disagreeable, but less so than that of carbonate of potash; the crystals contain a large quantity of water, the greater part of which they readily lose by exposure to dry air, and at high temperatures the salt becomes liquid and boils. Water at 60° dissolves at least half its weight of carbonate of soda, and boiling water considerably more; its specific gravity is 1·42.

Carbonate of Soda forms a double salt with carbonate of potash, consisting of two eqs. of the former, combined with one eq. of the latter, and eighteen eqs. of water, its formula being $2NaO\ CO^2,\ KO\ CO^2,\ 18HO$; and it has recently been stated that the carbonates of both these alkalis form double salts with nearly all the metallic oxides, as iron, zinc, copper, cobalt, &c.

Composition.—Carbonate of Soda in the ordinary crystallized state consists of

One equivalent	of Soda	32	or 22·2
One „	of Carbonic Acid	22	„ 15·3
Ten „	of Water	9×10=90	„ 62·5
	Equivalent	144.	100·

Formula...... $NaO,\ CO^2,\ 10HO$.

Carbonate of Soda combines with water in several proportions; the following formulæ exhibit the composition of the various hydrates.

	Equivalent.
NaO, CO^2, HO	63
$NaO, CO^2, 5HO$	99
$NaO, CO^2, 6HO$	108
$NaO, CO^2, 8HO$	126
$NaO, CO^2, 10HO$	144

Adulterations, Impurities, and Tests.—Carbonate of Soda is largely adulterated with crystallized sulphate of soda, which for most of the purposes for which carbonate of soda is employed is valueless, if not injurious. The most usual impurities are chloride of sodium, and sulphate of soda, of which the commercial salt always contains small and generally unimportant quantities, free soda, hyposulphite of soda, sulphuret and ferrocyanide of sodium, and silicate of soda. For tests, see MATERIA MEDICA: *Sodæ Carbonas.*

Incompatibles.—This salt is incompatible with acids, acidulous salts, lime-water, hydrochlorate of ammonia, and the earthy and metallic salts.

Pharmacopœia Preparations.—Liquor Sodæ, Liquor Sodæ Chlorinatæ, Pilula Ferri Composita, Sodæ Carbonas Exsiccata.

Pharmacopœia Uses.—Ferri Sesquioxidum, Ferri Carbonas cum Saccharo, Ferri Ammonio-Citras, Magnesiæ Carbonas.

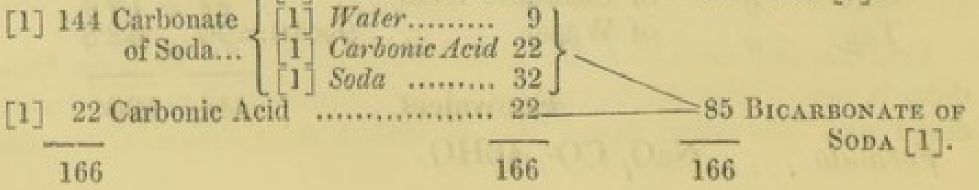
Medicinal Uses.—These are similar to those of the carbonate of potash, but this salt is preferable as being more mild and less nauseous. Dose, from gr. x. to ʒss. twice or thrice a day.

Soda combines with two other definite proportions of carbonic acid, forming the sesqui- and bicarbonate of soda.

Sesquicarbonate of Soda exists native, and is termed *trona*, and *urao*, by the natives of the districts where it occurs.

BICARBONATE OF SODA is inserted in the Materia Medica. This salt is manufactured on the large scale by exposing crystals of carbonate of soda to a continued current of carbonic acid gas, which they absorb with the evolution of heat, and a large quantity of aqueous vapour; if the process be continued until the crystals are thoroughly saturated with the gas, they will be converted into a true bicarbonate. It may also be prepared by passing a current of carbonic acid gas into a strong solution of carbonate of soda, when the bicarbonate falls as a crystalline arenaceous powder.

The subjoined diagram will illustrate these processes.



Properties.—Bicarbonate of soda crystallizes in oblique quadrilateral tables, which are slightly alkaline to the taste, and restore the colour to reddened litmus. As usually met with it is a white inodorous powder, remaining unaltered in dry, but is decomposed in damp air, being gradually converted into sesquicarbonate. Its solution, by long-continued ebullition, is converted into carbonate of soda, and when heated to redness it loses one-half of its carbonic acid, and all its water, being reduced to the state of anhydrous carbonate of soda. It is soluble in thirteen parts of cold water. When pure or crystallized it is composed of

One equivalent of Soda	....	32 or	37·6
Two „ of Carbonic Acid	$22 \times 2 = 44$	„	52·6
One „ of Water	....	9 „	9·8
Equivalent	....	85.	100·

Formula...... $NaO, 2CO^2, HO$.

Adulterations, Impurities, and Tests.—As usually met with it contains some free carbonate uncombined with a second equivalent of carbonic acid, but both effloresced carbonate and sulphate of soda are used as adulterants of this salt. When properly prepared, a solution of it should not precipitate a solution of sulphate of magnesia, whilst that, if any, afforded with solution of bichloride of mercury should be whitish, not red; when supersaturated with nitric acid it should not precipitate a solution of chloride of barium. See also MATERIA MEDICA: *Sodæ Bicarbonas.*

Incompatibles.—The same as the carbonate, excepting that it does not decompose the salts of magnesia until the mixture is heated.

Medicinal Uses.—Similar to those of the carbonate. Dose, gr. x. to gr. xxx. This salt is largely employed for the purpose of making what are called *sodaic powders*, by mixture with tartaric acid and water taken during effervescence; these are sometimes intended as a substitute for *soda water*, from which they differ in containing tartrate of soda, with a portion of carbonic acid diffused through the solution, instead of consisting of bicarbonate of soda with excess of carbonic acid gas.

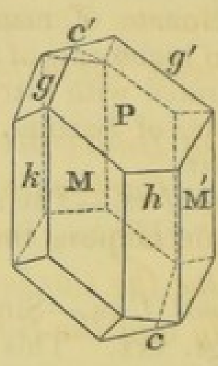
Carbonate of Soda is the salt usually employed in making the Phosphate, and the Potassio-tartrate of Soda, and, as the obtaining of Sulphate of Soda is the first step in the process of making carbonate of soda, I shall describe these three salts now inserted in Materia Medica in this place, and in the order in which I have named them.

PHOSPHATE OF SODA, the Sodæ Phosphas of the Materia Medica, is best prepared by digesting two pounds of carefully calcined and powdered bones mixed into a thin cream with ten pints of water, and then adding thirteen fluidounces and six fluid-drachms of sulphuric acid to the mixture, stirring frequently. To the clear acid solution, when boiling, add gradually carbonate of soda so long as effervescence continues; when this no longer takes place, filter the solution to separate the insoluble lime and magnesia salts, and set the solution aside to crystallize.

Process.—By adding sulphuric acid to *bone-ash*, or impure phosphate of lime, and water, the bone-ash is converted into phosphoric acid, holding a little lime, magnesia, &c. in solution; and the sparingly soluble sulphate of lime, which, for the most part, forms an insoluble residue, and is separated from the clear solution; when this latter is saturated by carbonate of soda, the carbonic acid of the carbonate is expelled, the soluble salts of lime and magnesia are precipitated, and phosphate of soda remains in solution, which readily crystallizes out and forms the Sodæ Phosphas of Materia Medica.

Properties.—The properties of phosphoric acid have already been described at length in pp. 68–72 of this work, where this acid is regarded as a tribasic acid. The primary form of Phosphate of Soda is an oblique rhombic prism; the crystal, of which a figure is annexed, possesses indistinct cleavages parallel to the planes M and M′.

P on M, or M′	106°	44′
P on *c*	129	12
P on *g*	112	27
P on *h*	121	14
M on M′............	67	30
M on *h*	123	45
M on K	146	15



This salt is at first transparent, but effloresces on exposure to air; it is alkaline to test-paper, soluble in about four parts of cold and two parts of hot water. When heated, this salt fuses in its water of crystallization, which it loses, and at a red heat, the dry salt fuses into a clear liquid, which remains transparent when cold: this is pyrophosphate, or bibasic phosphate of soda. The crystallized salt is a diphosphate of soda, consisting of

Two equivalents of Soda........	32×2=	64	or 17·7
One „ of Phosphoric Acid....		72	„ 20·0
Twenty-five „ of Water	9×25=	225	„ 62·3
Equivalent........		361.	100·

Formula...... PO^5, 2NaO, 25HO.

Phosphate of soda forms other compounds with water, and its acid several other salts with soda, which it would be foreign to the object of this work to consider.

Impurities, Adulterations, and Tests.—This salt is not very subject to adulteration, and the tests ordered in MATERIA MEDICA, *Sodæ Phosphas*, are quite sufficient to ascertain any impurity, with the exception of arsenic, in some state of combination, derived from the sulphuric acid used in its preparation. This is best detected by passing a current of hydrosulphuric acid gas through the solution, warming it in a closed vessel, and adding to it a little dilute phosphoric acid. If arsenic be present, a golden-yellow precipitate of its sulphuret will be produced.

Medicinal Uses.—Gently purgative. Dose, ℥j. to ℥jss. It is almost tasteless, and therefore a useful medicine for children.

SODÆ POTASSIO-TARTRAS, P.L. 1836.

Potassio-tartrate of Soda.

Natron Tartarizatum, P.L. 1788.
Soda Tartarizata, P.L. 1809, P.L. 1824.

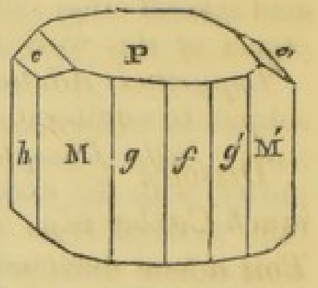
Take of Bitartrate of Potash, powdered, sixteen ounces,
Carbonate of Soda twelve ounces,
Water, boiling, four pints;

Dissolve the Carbonate of Soda in the boiling Water, and gradually add the Bitartrate of Potash. Strain the Liquor; then apply a gentle heat, until a pellicle floats, and set it aside, that crystals may be formed. The Liquor being poured off, dry them. Evaporate the Liquor again that it may yield crystals.

Process.—In this preparation the excess of tartaric acid contained in the bitartrate of potash is saturated with soda, by decomposing the carbonate and expelling its carbonic acid in the gaseous state, the process being precisely similar to that described under Potassæ Tartras.

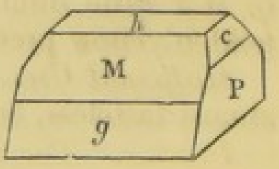
Properties.—This salt forms large and beautiful crystals. The form derived from cleavage is a *right rhombic prism*. This is modified in the crystals measured, as shown in fig. 1.

Fig. 1.



P on M, or M′	90°	0′
P on *c*	138	50
M on M	100	0
M on *g* M′ on *g′*	163	0

Fig. 2.



There is a peculiarity in the crystals of this substance. They are produced nearly in halves, and appear to have rested or been formed on planes which would have passed through the middle of the entire crystal. One of these natural segments is shown in fig. 2; but in others of them the front half of fig. 1. is the portion produced, the plane *f* being then uppermost. In some of the segments, however, there is a slight deviation from this exactness of position of the planes *f* or *h*.

This salt, sometimes called *Rochelle Salt* and *Sel de Seignette*, is colourless, inodorous, bitter and saline. It is soluble in five parts of water at 60°, and more so in boiling water. It is decomposed by a strong heat; the residuum consists of carbonate of potash and carbonate of soda.

Composition.—This is a double salt, consisting of

One equivalent	of Tartrate of Potash	114	or 40·0
One „	of Tartrate of Soda	98	„ 34·5
Eight „	of Water	72	„ 25·5
	Equivalent	284.	100·

Formula...... $KO, C^4 H^2 O^5; NaO, C^4 H^2 O^5; 8HO$.

Impurities and Tests.—See MATERIA MEDICA: *Sodæ Potassio-Tartras.*

Incompatibles.—Most acids and acidulous salts, excepting the bitartrate of potash. By the action of the acids the tartrate of potash is converted into bitartrate. The acetate and diacetate of lead and the salts of lime, are decomposed by this compound.

Medicinal Use.—Dose, as a purgative, from ʒij. to ℥j.

SODÆ SULPHAS, P.L. 1836.

Sulphate of Soda.

Sal Catharticus Glauberi, P.L. 1746.
Natron Vitriolatum, P.L. 1788.
Sodæ Sulphas, P.L. 1809, P.L. 1824.

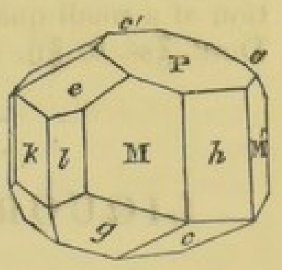
Take of the Salt which remains after the distillation of
Hydrochloric Acid two pounds,
Water, boiling, two pints,
Carbonate of Soda as much as is necessary ;

Dissolve the Salt in the Water; then gradually add as much Carbonate of Soda as is sufficient to saturate the Acid. Boil down until a pellicle appears, and the solution being strained, set it aside that crystals may be formed. The Liquor being poured off, dry them.

Process.—The production of sulphate of soda during the preparation of hydrochloric acid has been explained. The excess of sulphuric acid remaining after the decomposition of the chloride of sodium being comparatively small, the saturation of it by carbonate of soda, instead of expulsion by heat, is of less consequence than in the case of sulphate of potash.

Properties.—Sulphate of soda very readily crystallizes. The primary form of this salt is an *oblique rhombic prism.*

P on M, or M′	101°	20′
P on *e*, or *e*′	133	18
P on *h*	107	44
P on *c*′	130	45
M on M′	80	24
M on *h*	130	12
M on *l*	162	38
M on *k*	139	48



This salt has a very bitter taste. By exposure to the air it effloresces. It is extremely soluble in water, three parts of which, at 60°, dissolve one part of the salt: boiling water dissolves its own weight. It is insoluble in alcohol. When exposed to heat it melts in its water of crystallization; when the water has evaporated it becomes opaque white, and at a red heat it fuses, the fused salt having a specific gravity of 2·63. A hot saturated solution of sulphate of soda deposits anhydrous rhombic octohedrons at about 90° to 100°. This salt follows a singular law of solution in water, gradually increasing in solubility to 92°, when it is at its maximum, 100 parts of water at this temperature dissolving 322 parts of the crystallized salt, and then decreasing as the temperature rises, dissolving at 215° about the same quantity as at 87°.

This salt combines with various proportions of water; its ordinary composition is appended. Soda forms a sesquisulphate and a bisulphate with sulphuric acid, neither of which salts are employed in medicine.

Composition.—Anhydrous Sulphate of Soda is composed of

One equivalent of Soda..............	32	or 44·45
One " of Sulphuric Acid......	40	" 55·55
Equivalent......	72.	100·

The ordinary crystallized salt consists of

One equivalent of Soda..............	32	or 19·75
One " of Sulphuric Acid	40	" 24·69
Ten " of Water	90	" 55·56
Equivalent......	162.	100.

Formula...... $NaO, SO^3, 10HO$.

Impurities and Tests.—See MATERIA MEDICA: *Sodæ Sulphas.*

Incompatibles.—Carbonate of potash, chloride of calcium, solution of barytes and barytic salts; acetate and diacetate of lead; and nitrate of silver, if the solution be strong.

Medicinal Uses.—A common and efficient purgative. Its nauseous taste may be in a great degree disguised by the addition of a small quantity of lemon-juice, or of bitartrate of potash. Dose, ℥ss. to ℥ij.

LIQUOR SODÆ CHLORINATÆ.

Solution of Chlorinated Soda.

Liquor Sodæ Chlorinatæ, P.L. 1836.

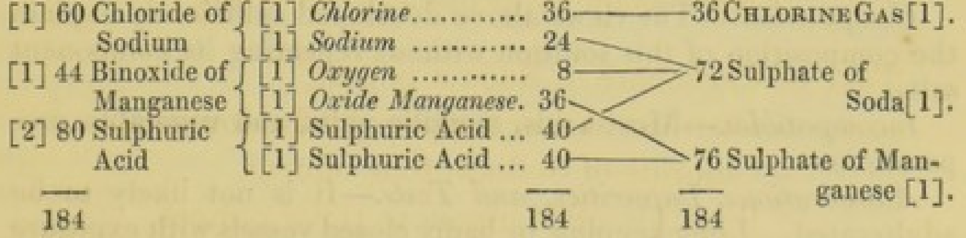
Take of Carbonate of Soda a pound,
Distilled Water forty-eight fluidounces,
Chloride of Sodium four ounces,
Binoxide of Manganese three ounces,
Sulphuric Acid two fluidounces and a half;

Dissolve the Carbonate in two pints of the Water; then put the Chloride and Binoxide, rubbed to powder, into a retort; and add to them the Sulphuric Acid, previously mixed with three fluidounces of the Water and cooled. Heat the mixture and pass the Chlorine first through five fluidounces of the Water, and afterwards into the solution of Carbonate above directed.

The colour of turmeric when moistened with this solution is first of all rendered tawny, and then all colour disappears. Diluted hydrochloric acid being added, both carbonic acid and chlorine are evolved; solution of sulphate of indigo is decolorized by the latter; lime is precipitated from solution of lime by the former.

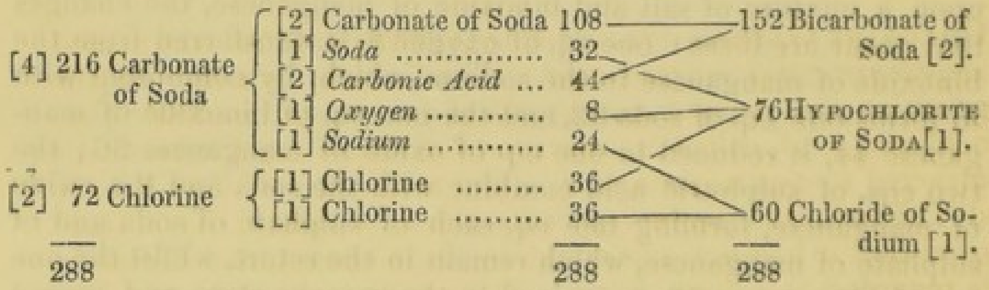
Process.—The extrication of chlorine gas by the mutual action of hydrochloric acid and binoxide of manganese will be explained hereafter. See CALX CHLORINATA. The process here employed being different, it will be proper to describe it also.

One equivalent of chloride of sodium 60, is composed of one eq. of *chlorine* 36, and one eq. of *sodium* 24. One equivalent of binoxide of manganese 44, consists of one eq. of *oxygen* 8, and one eq. of *oxide of manganese* 36. When Sulphuric Acid acts upon a mixture of salt and binoxide of manganese, the changes that occur are these: one eq. of oxygen 8, is transferred from the binoxide of manganese to the sodium, which, by combining with it, forms one eq. of soda 32, and the one eq. of binoxide of manganese 44, is reduced to one eq. of oxide of manganese 36; the two eqs. of sulphuric acid combine with the soda and the oxide of manganese, forming one eq. each of sulphate of soda and of sulphate of manganese, which remain in the retort, whilst the one eq. of CHLORINE 36, is evolved in the gaseous state and passed through water, in order to separate any hydrochloric acid which might accidentally arise, and which would convert a portion of the carbonate of soda into common salt. This decomposition will be rendered clearer by the subjoined diagram.



The precise nature of this solution can scarcely yet be regarded as determined; there are however good grounds for considering it to be a compound of chloride of sodium, bicarbonate of soda, and hypochlorite of soda; and as this is a perfectly rational hypothesis it may be regarded as correct. When the quantity of chlorine gas does not exceed that liberated from the ingredients here directed, no carbonic acid is expelled from the carbonate of soda, and the compound formed may be made to crystallize, and consists of hypochlorite and carbonate, or more probably bicarbonate of soda; these crystals when redissolved reproduce the disinfecting liquid.

Adopting this hypothesis, the following changes occur when a *limited* quantity of chlorine is absorbed by carbonate of soda. Four equivalents of carbonate of soda 216, may be regarded as consisting of two eqs. of carbonate of soda 108, two eqs. of *carbonic acid* 44, one eq. of *soda* 32, one eq. of *sodium* 24, and one eq. of *oxygen* 8; now when two equivalents of chlorine 72, act upon these four eqs. of carbonate of soda, one eq. of chlorine 36, combines with the one eq. of sodium 24, to form one eq. of chloride of sodium 60; the second eq. of chlorine 36, uniting with the one eq. of oxygen 8, produces one eq. of hypochlorous acid 44, which combining with the one eq. of soda 32, forms one eq. of hypochlorite of soda 76, whilst the two eqs. of carbonic acid 44, are absorbed by the two eqs. of carbonate of soda 108, and yield two eqs. of bicarbonate of soda 152, and these three salts, in solution together, form the solution of chlorinated soda of the Pharmacopœia.



Properties.—This solution is of a pale yellow colour; its taste is sharp, saline, and astringent. When exposed to the air it gradually evolves chlorine, and crystals of carbonate of soda are formed; its disinfecting property depends upon this gradual escape of chlorine.

Composition.—The views above developed sufficiently explain the composition of this solution without repeating its component salts.

Incompatibles.—Most acids, metallic salts, and vegetable preparations.

Adulterations, Impurities, and Tests.—It is not likely to be adulterated. Long keeping in badly closed vessels with exposure to light will gradually render this preparation inert. For Tests, see the text.

Pharmacopœia Preparation.—Cataplasma Sodæ Chlorinatæ.

Medicinal Use.—As a disinfectant.

When treating of Chloroform I deemed it advisable to depart from my general plan and to postpone the consideration of the nature of, and the views entertained respecting, the compounds chlorine forms with the alkalis and alkaline earths, and the properties of this elementary gas; believing that it would prove more instructive, in the first place, not to overload a somewhat complex subject, the formation of chloroform, with the secondary details of the formation of *bleaching powder*, also a complex subject; and secondly, that it would greatly assist the reader to have these interesting compounds considered together, instead of being scattered throughout the work in detached portions and under various heads. For these reasons I departed from my usual plan of considering every substance named either under the first preparation in which it occurs, or if that be an unimportant compound, under the most important preparation into the composition of which it enters. I therefore deferred the consideration of Calx Chlorinata to the present time, and contented myself, when treating of chloroform, with simply indicating the nature of the compound chlorine forms with lime, reserving a detailed account of it until I came to treat of the somewhat similar compound, Liquor Sodæ Chlorinatæ: I shall therefore in this place consider the properties and constitution of Calx Chlorinata, and of its most important constituent, Chlorine.

CHLORINE GAS was discovered by Scheele in 1774, who named it *dephlogisticated marine acid.* The French chemists, on the supposition that it was a compound of oxygen and muriatic (hydrochloric) acid, called it *oxygenated muriatic acid,* afterwards contracted to *oxymuriatic acid.* The researches of Gay-Lussac and Thénard, and more especially those of Davy, have since proved that it had not, nor could be decomposed, and therefore it is regarded as a simple body. Davy gave it the name of Chlorine on account of its greenish tint.

Chlorine exists in combination with the metal sodium, forming common salt, termed chemically chloride of sodium, from the decomposition of which, or from that of hydrochloric acid direct, it is usually obtained. The former plan is adopted in preparing *Liquor Sodæ Chlorinatæ,* and the latter was used in the last Pharmacopœia in making "Calx Chlorinata."

Properties.—Chlorine Gas is of a greenish yellow colour, a disagreeable, irritating and suffocating odour, and an astringent taste. 100 cubic inches weigh between 76 and 77 grains, and its specific gravity is 2·395. It is the most powerful known agent for destroying noxious miasmata, effluvia, and putrid smells, and is much employed in fumigations. When subjected to a pressure of about four atmospheres it liquifies, but does not solidify even at—166°. Water at 60° dissolves about twice its volume of this gas, which it gives out again when heated; the solution has both the colour and odour of the gas, and like it quickly destroys the colour of vegetable substances, and hence its extensive use in bleaching. When the aqueous solution is exposed to light, water is decomposed, its oxygen is evolved in the aëriform state, and its hydrogen combines with the chlorine to form hydrochloric acid which remains in solution. Chlorine also forms a definite compound with water which crystallizes at 32° in acicular prisms, having a specific gravity of 1·2, and consisting, according to Faraday, of

One equivalent of Chlorine	36	or	28·6
Ten „ of Water	90	„	71·4
Equivalent	126.		100·

When a mixture of equal volumes of chlorine and hydrogen gases is kept in the dark, no action ensues; in daylight union slowly takes place, in sunlight rapidly, frequently accompanied with explosion, as is also the case when a lighted taper is applied to the mixture, hydrochloric acid gas being formed equal in volume to that of the two gases employed.

Chlorine and oxygen do not combine by direct action, but by intermediate chemical agency several compounds of these two elements have been formed, the composition of which will be seen from the following table.

			Eq. No.	Formulæ.
1 eq. of Chlorine	36	=Hypochlorous Acid	44	ClO.
1 „ of Oxygen	8			
1 „ of Chlorine	36	=Chlorous Acid	60	ClO^3.
3 „ of Oxygen	24			
1 „ of Chlorine	36	=Perchlorous Acid	68	ClO^4.
4 „ of Oxygen	32			
1 „ of Chlorine	36	=Chloric Acid	76	ClO^5.
5 „ of Oxygen	40			
1 „ of Chlorine	36	=Perchloric Acid	92	ClO^7.
7 „ of Oxygen	56			

When phosphorus, and some metals in a state of minute division, are brought into contact with chlorine, they burn, and combining with it are converted into chlorides: charcoal, although heated to whiteness in chlorine gas, neither burns in, nor combines with it.

Various opinions have been and still are entertained respecting the nature of the compound commonly called *chloride of lime*, or *bleaching powder*, chlorine forms when it is absorbed by slacked lime, and objections of weight may be urged against every theory of the constitution of this substance which has hitherto been published. Chemists, however, are now generally disposed to ascribe its properties to a salt of hypochlorous acid, and to consider it as essentially composed of *hypochlorite of lime* and chloride of calcium, containing water and excess of lime.

I shall adopt this view of its nature in explaining its formation. Subjoined is the process of the last Pharmacopœia for preparing

CALX CHLORINATA, P.L. 1836.

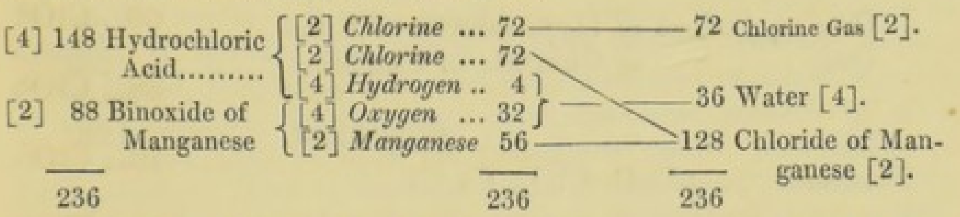
Chlorinated Lime.

Take of Hydrate of Lime a pound,
Chlorine as much as may be sufficient ;

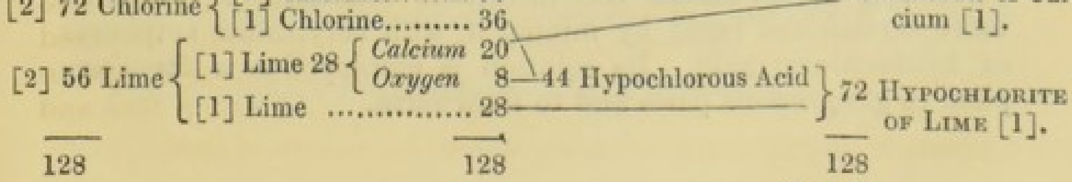
Pass Chlorine to the Lime, spread in a proper vessel, until it is saturated.

Chlorine is very readily evolved from Hydrochloric Acid added to Binoxide of Manganese, with a gentle heat.

Process.—Four eqs. of hydrochloric acid 148, consist of four eqs. of *chlorine* 144, and four eqs. of *hydrogen* 4; two eqs. of binoxide of manganese are composed of four eqs. of *oxygen* 32, and two eqs. of *manganese* 56. When the acid and oxide react, the following re-arrangement of their constituents takes place: two of the eqs. of chlorine 72, combine with the two eqs. of manganese 56, and form two eqs. of chloride of manganese 128, and two eqs. of chlorine 72, are liberated in the gaseous form; the four eqs. of *hydrogen* 4, and the four eqs. of *oxygen* 32, combining to form four eqs. of water 36.



When the liberated chlorine comes into contact with the slaked lime, the following changes occur:—The two eqs. of chlorine 72, act upon two eqs. of lime 56, by which one eq. of lime 28, is resolved into one eq. of *calcium* 20 and one eq. of *oxygen* 8, and one eq. of chlorine 36, combines with the one eq. of calcium 20, to form one eq. of chloride of calcium 56; the remaining one eq. of chlorine 36, unites with the one eq. of oxygen 8, to form one eq. of hypochlorous acid 44, and this combining with the remaining eq. of lime forms one eq. of HYPOCHLORITE OF LIME 72.



Properties.—Chlorinated lime is a white or brownish-white powder; it exhales a peculiar odour, somewhat different from that of chlorine, and has a bitter, astringent, and acrid taste. By exposure to the air it attracts both moisture and carbonic acid, and by the latter its chlorine is gradually expelled, probably as hypochlorous acid, whilst carbonate of lime is formed, which remains mixed with the chloride of calcium.

It is but partially soluble in water, most of the excess of lime remaining undissolved. The solution, on account of the uncombined lime which it contains, first acts as an alkali on vegetable colours, and then bleaches them. If the solution be boiled, the hypochlorite of lime is converted, by a re-arrangement of its elements, into chlorate of lime and chloride of calcium.

When this powder is heated in a retort, chlorine is first liberated, and then oxygen gas, the latter being derived from the decomposition both of the hypochlorous acid and of the lime combined with it, chloride of calcium being formed.

When distilled with dilute sulphuric acid, in quantity insufficient to decompose the whole of it, hypochlorous acid is evolved, which like chlorine itself possesses great bleaching powers, and is also an excellent antiseptic; when excess of sulphuric acid is added then the hypochlorous acid is decomposed, and chlorine gas is evolved by its action.

Composition.—According to this view of its constitution, bleaching powder is composed of

One equivalent of Hypochlorite of Lime	72
One ,, of Chloride of Calcium	56
Equivalent.	128

Formula. . . . . . $CaO, ClO; Ca Cl$.

It must however be remembered that it contains water in considerable quantity, without the presence of which it probably could neither be formed, nor exist, together with uncombined hydrate of lime.

Incompatibles.—Nitric, hydrochloric, sulphuric, and carbonic acids, and the alkaline carbonates, decompose it; the acids evolve chlorine copiously, and the carbonates precipitate carbonate of lime, while the alkaline chlorides and hypochlorites formed remain in solution.

Pharmacopœia Use.—Chloroformyl.

Medicinal Uses.—Antiseptic and disinfectant. Its action in correcting putrid smells and infectious miasmata is rendered more certain and rapid by mixing it with very dilute sulphuric or hydrochloric acid. Its solution is employed as a lotion applied to gangrenous parts and to fetid sores.

PRÆPARATA E ZINCO.

PREPARATIONS OF ZINC.

Remarks.—ZINC occurs mineralized by sulphur, forming *Blende*, and by oxygen and carbonic acid as *Calamine*; these are the principal ores from which the zinc of commerce is obtained, although its oxide is found associated with other substances. Zinc is a bluish-white metal of considerable lustre, and specific gravity varying from 6·861 to 7·191. It possesses a crystalline structure, and is somewhat brittle at ordinary temperatures, but is both ductile and malleable between 210° and 300°. At about 392° it may be reduced to powder. It fuses at 773°, and when slowly cooled crystallizes in pentagonal dodecahedrons and in six-sided prisms. It sublimes when strongly heated in close vessels, and distils when the temperature is raised to a white heat. When this metal is heated nearly to redness with free access of oxygen, it ignites, and burns rapidly with a brilliant bluish-green flame, yielding yellowish-white flocculent vapours of oxide of zinc, formerly termed *lana philosophorum*, *flowers of zinc*, *nihil album*, and, as it is yet sometimes called, *pompholix*, or *tutty powder*. This is the only oxide of this metal known. The symbol or formula of zinc is Zn, and its equivalent number 32.

Impurities and Tests.—Zinc is very difficult to obtain absolutely pure; the zinc of commerce is usually contaminated with traces of iron, lead, antimony, and arsenic, and sometimes with cadmium, but these impurities seldom occur in sufficient quantities to injure the medicinal preparations of this metal. Arsenic may be detected by the well-known Marsh's test mentioned under the Preparations of Antimony. The characteristic tests of zinc are the production of a white precipitate when the caustic alkalis are added to its solutions, soluble again in excess of the precipitant, a white precipitate on the addition of an alkaline sulphuret to a perfectly neutral solution, and a bulky white precipitate with ferrocyanide of potassium. See MATERIA MEDICA, *Zincum*.

Pharmacopœia Preparation.—Zinci Chloridum.

ZINCI CHLORIDUM.

Chloride of Zinc.

Take of Hydrochloric Acid a pint,
Distilled Water two pints,
Zinc, broken into fragments, seven ounces;

Mix the Acid with the Water and to them add the Zinc; and when the effervescence is nearly finished, apply heat, until bubbles are no longer evolved. Pour off the solution, strain, and evaporate until the salt is dried. Fuse this in a lightly covered crucible at almost a red heat, and pour it on to a smooth and clean stone. Lastly, when cold, break it into fragments, and keep it in a closely stoppered vessel.

Colourless. It deliquesces in the air, is dissolved in rectified spirit and in water. From the aqueous solution, hydrosulphuric acid or ferrocyanide of potassium being poured in, a white precipitate is thrown down. What is precipitated by ammonia or potash is white, and is again dissolved by the addition of either in excess. Moreover, whatever is precipitated on the addition of either carbonate of soda* or of potash is white, and is not again dissolved on the addition of an excess of either of these precipitants.

Remarks.—This preparation, now inserted in the Pharmacopœia, may also be obtained by the direct combination of the heated metal and chlorine gas, or by distilling dried sulphate of zinc and chloride of sodium; the method above given is however the readiest, and affords a very pure salt if the zinc employed be pure.

Process.—When one equivalent of zinc 32, is dissolved in one eq. of hydrochloric acid 37, composed of one eq. of *chlorine* 36, and one eq. of *hydrogen* 1, the latter is decomposed, the one eq. of zinc 32, abstracting the one eq. of chlorine 36 from the hydrochloric acid, forming one eq. of chloride of zinc 68, which is dissolved in the water of the diluted acid, and the one eq. of

---

* I have here ventured to replace "ammonia" in the text by "soda;" an excess of the ammoniacal salt redissolving the precipitate.—Ed.

hydrogen 1, is liberated in the aëriform state, as explained in the following diagram.

[1] 37 Hydrochloric Acid …… { [1] *Hydrogen* 1 —— 1 Hydrogen *Gas* [1].
{ [1] *Chlorine*.. 36 ——
[1] 32 Zinc …………………………… —— 68 Chloride of Zinc [1].
69 —— 69

Properties.—Chloride of Zinc prepared by the above process is colourless and transparent, but before it cools it is covered with a thin opaque coating, owing to the absorption of a little atmospheric moisture, so that it presents the appearance of a translucent mass. It has a disagreeable styptic taste, and like the sulphate of this metal, which however is to be preferred, is a rapid and most effective emetic; it is extremely deliquescent, and of course is very soluble in water; it is also soluble in and crystallizes in combination with alcohol: it forms double salts with several other metallic chlorides, and also combines with oxide of zinc in various proportions.

Composition.—Chloride of zinc consists of

One equivalent of Zinc ……	32	or	47·06
One „ of Chlorine….	36	„	52·94
Equivalent….	68		100·

Formula…. Zn Cl.

Impurities, Adulterations, and Tests.—This preparation is not liable to fraudulent adulteration, but as met with in commerce is likely to be impure from the employment of impure materials.

The chlorides of iron and of lead are probable impurities, which may be detected by the tests above ordered. M. Lassaigne has also pointed out that the commercial chloride sometimes contains as much as twelve per cent. of arseniate of zinc, which being insoluble in solution of this chloride in water, is easily detected.

Medicinal Uses.—As a caustic. Internally in epilepsy and scrofula, in doses of from gr. j. to gr. ij.

ZINCI OXIDUM.

Oxide of Zinc.

Zincum Calcinatum, P.L. 1788.
Zinci Oxydum, P.L. 1809, P.L. 1824, P.L. 1836.

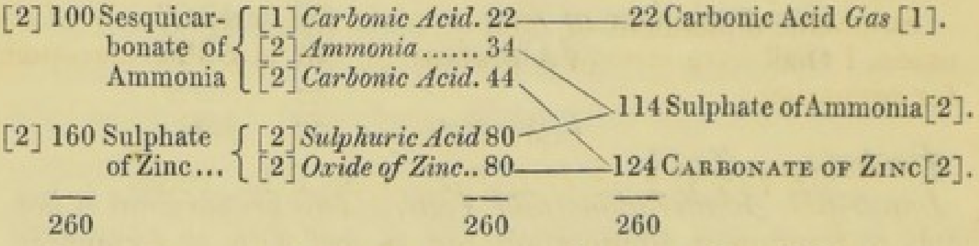
Take of Sulphate of Zinc a pound,
Sesquicarbonate of Ammonia six ounces and a half,
Distilled Water three gallons

Dissolve the Sulphate and Sesquicarbonate, separately, in twelve pints of the Water, and strain; then mix. Wash what is precipitated frequently with water; and lastly, ignite it for two hours in a strong fire.

Pulverulent, yellowish-white; it is dissolved in ammonia, in potash, and in hydrochloric acid.

Remarks.—OXIDE OF ZINC has already been alluded to; when prepared by the above directions, its density and colour differ from that prepared by combustion.

Process.—When one equivalent of sulphate of zinc is added to one eq. of sesquicarbonate of ammonia, double decomposition takes place, sulphate of ammonia and basic carbonate of zinc being formed, whilst carbonic acid gas is liberated. For convenience' sake I shall regard the salts as anhydrous, and the carbonate of zinc as being a neutral salt, in the subjoined diagram.



The carbonate of zinc thus obtained, when plentifully washed with hot water, is a white powder, consisting, according to an analysis of the Editor, of

Five equivalents of Oxide of Zinc..	$40 \times 5 = 200$	or	71·43
Two „ of Carbonic Acid..	$22 \times 2 = 44$	„	15·71
Four „ of Water	$9 \times 4 = 36$	„	12·86
Equivalent....	280.		100·

Formula.... $5ZnO, 2CO^2, 4HO$.

By roasting the above carbonate of zinc as directed, the carbonic acid and the water it contains are expelled, and if the sulphate employed were pure, a perfectly pure oxide of zinc is obtained.

Composition.—Oxide of Zinc is composed of

One equivalent of Zinc	32	or	80
One „ of Oxygen	8	„	20
Equivalent....	40.		100·

Formula.... ZnO.

Properties.—It is yellowish-white, inodorous, insipid, and insoluble in water, is readily dissolved by the acids, with most of which it forms crystallized salts, and combines with the alkalis, forming definite compounds of much interest in a scientific view. It forms a hydrate containing an equivalent each of water and of oxide of zinc. This oxide is met with in the chimneys of zinc works in pyramidal dodecahedrons and hexagonal prisms. It of late has been used as a pigment.

Impurities, Adulterations, and Tests.—Oxide of zinc is sometimes adulterated with starch, chalk, and carbonate of magnesia; the tests ordered in the text are sufficient to detect these adulterations. It may be impure from carbonic acid arising either from incomplete roasting or not having been calcined at all; if it contain sulphuric acid or a sulphate, these would yield a precipitate with chloride of barium from its nitric acid solution; it may also contain traces of the foreign metals existing in the sulphate from which it has been made.

Incompatibles.—This oxide is of course incompatible with the acids and acidulous salts.

Pharmacopœia Preparation.—Unguentum Zinci.

Medicinal Use.—Tonic. Dose, gr. j. to gr. vj. twice a day in the form of pill.

Sulphate of Zinc being employed in the preparation of the oxide, I shall here insert the process of the last Pharmacopœia for preparing

ZINCI SULPHAS, P.L. 1836.

Sulphate of Zinc.

Vitriolum Album Depuratum, P.L. 1721.
Sal Vitrioli, P.L. 1746.
Zincum Vitriolatum, P.L. 1788.
Zinci Sulphas, P.L. 1809, P.L. 1824.

Take of Zinc, in small pieces, five ounces,
Diluted Sulphuric Acid two pints;

Pour gradually the diluted Sulphuric Acid upon the pieces of Zinc, and the effervescence being finished, strain the liquor; then boil it down until a pellicle begins to form. Lastly, set it aside that crystals may be formed.

Remarks.—I quote the following admirable observations on the action of sulphuric acid upon zinc from Liebig and Gregory's edition of 'Turner's Chemistry,' vol. i. p. 192, 1847. These remarks are capable of the widest application in respect to the simultaneousness of chemical combinations and decompositions. "The action of dilute sulphuric acid on metallic zinc affords an instance of what was once called *Disposing Affinity.* Zinc decomposes pure water at common temperatures with extreme slowness, but as soon as sulphuric acid is added, decomposition of the water takes place rapidly, though the acid merely unites with oxide of zinc. The former explanation was, that the affinity of the acid for oxide of zinc disposed the metal to unite with oxygen, and thus enabled it to decompose water; that is, the oxide of zinc was supposed to produce an effect previously to its existence. The obscurity of this explanation arises from regarding changes as consecutive which are in reality simultaneous. There is no succession in the process; the oxide of zinc is not formed previously to its combination with the acid, but at that very instant. There is, as it were, but one chemical change, which consists in the combination at one and the same moment of zinc with oxygen, and of oxide of zinc with the acid; and this change occurs because these two affinities acting together overcome the attraction of oxygen and hydrogen for one another."

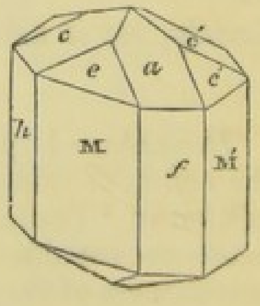
Process.—When one equivalent of hydrated sulphuric acid 49, consisting of one eq. of *sulphuric acid* 40, and one eq. of *water* 9, which itself consists of one eq. of *oxygen* 8, and one eq. of *hydrogen* 1, acts upon one eq. of zinc 32, the water is decomposed, and the one eq. of oxygen 8, combines with the one eq. of zinc 32, forming one eq. of oxide of zinc 40, and this combining with the one eq. of sulphuric acid 40, produces one eq. of sulphate of zinc 80, whilst the one eq. of hydrogen 1, is evolved in the aëriform state. The subjoined diagram illustrates the process just described.

[1] 49 Hydrated ⎧ [1] *Hydrogen*...... 1 ———————— 1 Hydrogen
Sulphuric ⎨ [1] *Sulphuric Acid* 40 ———— *Gas* [1].
Acid...... ⎩ [1] *Oxygen*......... 8 ⎫
[1] 32 Zinc ....32 ⎭ 40 Oxide of Zinc [1]. — 80 SULPHATE OF ZINC [1].
—— —— ——
81 81 81

Properties.—The solution of sulphate of zinc is colourless, and by evaporation it readily yields crystals, which are also devoid of colour; the primary form of this salt is a *right rhombic prism.*

It may be cleaved parallel to the plane *h* of the annexed figure; no distinct cleavages have been observed in any other direction.

M on M′	91° 7′
M on *f*	135 33
M on *h*	134 27
M on *e*	128 58
a on *f*	120 0
h on *c*	119 23



The crystals of this salt are usually very small, and not readily distinguishable from those of sulphate of magnesia; sulphate of zinc has a disagreeable metallic taste; it is not altered by exposure to the air, but if moderately heated loses its water of crystallization, and when it is subjected to a high temperature is entirely decomposed, the acid being expelled, and the oxide only remaining; it is soluble in two and a half times its weight of water at 60°, and much more so in boiling water. The alkalis ammonia, potash, and soda decompose the solution, and give a white precipitate; but if they are used in excess, then the precipitate is redissolved; the alkaline carbonates throw down white carbonate of zinc; water impregnated with hydrosulphuric acid decomposes the solution, and forms a white precipitate; it forms several distinct hydrates with water and double salts with many other sulphates.

Composition.—Ordinary crystallized Sulphate of Zinc is composed of

One equivalent	of Oxide of Zinc	40	or 28
One „	of Sulphuric Acid	40	„ 28
Seven „	of Water	63	„ 44
	Equivalent	143.	100·

Formula.... $ZnO, SO^3, 7HO$.

Adulterations, Impurities, and Tests.—It is seldom adulterated, but is generally impure when met with as it occurs in commerce, under the names of "white vitriol" or "white copperas," from the admixture of salts of magnesia, copper, oxide of iron, oxide of manganese and other metals. To obtain it sufficiently pure for all medicinal purposes, add a little solution of chlorinated soda to a strong solution of this sulphate and allow it to stand for twenty-four hours, stirring frequently; this mixture is then to be boiled, adding carbonate of soda or ammonia, until a whitish precipitate begins to fall; continue the boiling for a few minutes, then strain the solution and crystallize. For tests see MATERIA MEDICA: *Zinci Sulphas*.

Incompatibles.—Alkalis and their carbonates, lime-water, and astringent vegetable infusions.

Pharmacopœia Preparations.—Liquor Aluminis Compositus, Zinci Oxidum.

Medicinal Uses.—Internally as a tonic and astringent. Dose, gr. i. to gr. ij., which may be gradually increased to gr. v. or gr. vi. without exciting nausea. It operates quickly as an emetic, in doses of gr. x. to gr. xxx. Externally it is employed as an astringent, as a substitute for the preparations of lead, in the proportion of gr. x. to eight fluidounces of water.

MISTURÆ.

MIXTURES.

Remarks.—The term *mucilage* was originally employed in pharmacy to denote those preparations in which a soluble or partially soluble substance formed a viscid solution with water; these were generally employed to suspend an insoluble powder, as when gum arabic is dissolved for the purpose of holding chalk in mechanical mixture. This distinctive term has now been abandoned, and the mucilages have been either transferred to Decoctions, or retained under the present heading as *Mixtures.* There are a few of the preparations now classed as mixtures which are scarcely included in the definition above given; and, in prescribing, the word *mixture* is frequently used to signify a compound, all the ingredients of which are in perfect solution.

MISTURA ACACIÆ.

Mixture of Acacia.

Mucilago Arabici Gummi, P.L. 1788.
Mucilago Acaciæ, P.L. 1809, P.L. 1824.
Mistura Acaciæ, P.L. 1836.

Take of Acacia, powdered, ten ounces,
Distilled Water, boiling, a pint;
Rub the Acacia with the Water gradually poured in, until it is dissolved.

Remarks.—Acacia Gum, usually called *Gum Arabic,* is an exudation from various trees, natives of Arabia, Egypt, &c., belonging to the natural family *Leguminosæ*; it occurs in pieces varying from the size of a pea to that of a walnut; it is colourless, brown or yellowish, translucent or semi-opaque; its fracture is brilliant and conchoidal; it is inodorous with a slightly sweetish taste; it is moderately hard, and when dry very brittle and easily pulverized, unalterable in dry air, soluble in water, and miscible with it in all proportions, but insoluble in alcohol or in ether. The specific gravity of gum arabic varies from 1·316 to 1·525.

Acetic acid and dilute acids in general dissolve gum; nitric acid when somewhat concentrated converts it into mucic acid, with some oxalic acid; strong sulphuric acid decomposes it, especially when heated, with the production of charcoal and the evolution of gaseous matter.

When heated to a temperature of 266° it loses an equivalent of water; and by exposure to air and a strong heat, it is first carbonized and then dissipated.

The pure portion of gum arabic is termed *arabin*, 100 parts of which, after drying at 212°, consist of

Twelve equivalents of Carbon ..	$6\times12=72$	or	42·10
Eleven ,, of Hydrogen	$1\times11=11$	,,	6·43
Eleven ,, of Oxygen ..	$8\times11=88$	,,	51·47
Equivalent......	171.		100·

Formula...... $C^{12}H^{11}O^{11}$.

This composition is identical with that of crystallized cane-sugar.

Impurities, Adulterations, and Tests.—Gum acacia is adulterated with inferior descriptions of this drug, *ex. gr.* Gum Senegal. It should be whitish or yellowish white, and perfectly soluble in its own weight of water.

Incompatibles.—Rectified spirit, many tinctures, diacetate of lead, and some other metallic salts, as the sesquisalts of iron and protonitrate of mercury.

Pharmacopœia Preparations.—Confectio Amygdalæ, Mistura Cretæ, Mistura Guaiaci, Pulvis Ipecacuanhæ Compositus, Pulvis Tragacanthæ Compositus.

Medicinal Use.—Demulcent in allaying irritation of the urinary passages, &c.

MISTURA AMMONIACI.

Mixture of Ammoniacum.

Lac Ammoniaci, P.L. 1746, P.L. 1788.
Mistura Ammoniaci, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Prepared Ammoniacum five drachms,
Distilled Water a pint;

Rub the Ammoniacum with the Water, gradually poured in, until they are perfectly mixed.

Medicinal Use.—Expectorant. Dose, f℥ss. to f℥j. It may be advantageously combined with tincture of squill, and more so than with the vinegar of the same medicine, for it is slightly curdled by acids. In this mixture the resinous insoluble matter of the ammoniacum is suspended by the solution of its gummy constituent.

MISTURA AMYGDALÆ.

Mixture of the Almond.

Emulsio Communis, P.L. 1746.
Lac Amygdalæ, P.L. 1788.
Mistura Amygdalæ, P.L. 1809.
Mistura Amygdalarum, P.L. 1809, edit. alt., P.L. 1824.
Mistura Amygdalæ, P.L. 1836.

Take of Confection of the Almond two ounces and a half,
Distilled Water a pint;

Add the Water to the Confection gradually rubbing them together, until they are mixed; afterwards strain through linen.

Medicinal Use.—Demulcent and diluent. It is generally employed as a vehicle for more active medicines. Acids, spirit of wine, and many tinctures, render this preparation turbid, and should not be exhibited with it.

MISTURA CAMPHORÆ.

Mixture of Camphor.

Julepum e Camphorâ, P.L. 1746.
Mistura Camphorata, P.L. 1788.
Mistura Camphoræ, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Camphor half a drachm,
Rectified Spirit ten minims,
Distilled Water a pint;
First rub the Camphor with the Spirit, then with the Water gradually poured in, and strain through linen.

Medicinal Use.—Stimulant. Dose, f℥j. to f℥ij. every three or four hours. Water dissolves very little camphor; this mixture is therefore generally used only as a vehicle for more important medicines.

The CAMPHOR used in this country is chiefly the produce of a tree belonging to the natural family *Lauraceæ*, growing in the islands of Formosa and Sumatra.

Properties.—Rough or crude camphor consists of greyish dirty crystalline grains, aggregated into friable masses, which occasionally contain small shining crystals of camphor. It is procured by boiling the leaves, wood, and root of the tree with water, and condensing the vapour by a rough method of distillation or sublimation. When refined by mixing with lime and sublimation, camphor has the following properties:—it is colourless, translucent, presents a crystalline structure when broken, and has a powerful aromatic, but not disagreeable odour, with a bitter pungent taste. Its specific gravity is 0·989.

It is not hard, but tough, and is not readily pulverizable without the addition of a little spirit of wine; it evaporates in the air, though slowly at common temperatures; and exposed in transparent glass vessels to the action of the light, it sublimes and crystallizes on their sides, the primary form of the crystal being a right rhombic prism. When small pieces are thrown on the surface of water, they rotate; it is but very slightly soluble in water, but enough to impart to it its odour and taste. Rectified spirit readily dissolves it, and water precipitates most of it from this solution; it is also soluble in ether, the volatile and fixed oils and acids, but not in alkalis. It readily dissolves in Chloroform, and this solution forms a kind of emulsion with water, affording a ready and elegant method of exhibiting camphor.

When heated it fuses at 349° into a transparent liquid, boiling at 390°, and subliming unchanged; it burns in the air with a large white, though sooty, flame.

Composition.—According to Dumas, camphor consists of

Twenty equivalents of Carbon..	$6\times20=120$	or	78·94
Sixteen ,, of Hydrogen	$1\times16=16$	,,	10·53
Two ,, of Oxygen..	$8\times2=16$	,,	10·53
Equivalent......	152.		100·

Formula...... $C^{20}H^{16}O^{2}$.

When camphor is heated with glacial phosphoric acid a volatile hydrocarbon is produced, the formula of which is $C^{20}H^{14}$: this is identical with *Cymin*, see Emplastrum Cumini; and when boiled with strong nitric acid, *camphoric acid* is formed which crystallizes with one eq. of water, and forms an unimportant class of salts.

Adulterations and Tests.—Camphor is said to be sometimes adulterated with hydrochlorate of ammonia, which would be readily detected by the ammoniacal fumes exhaled when rubbed with a little lime or solution of potash.

Pharmacopœia Preparations.—Ceratum Hydrargyri Compositum, Ceratum Plumbi Compositum, Linimentum Camphoræ, Linimentum Camphoræ Compositum, Linimentum Hydrargyri, Linimentum Saponis, Linimentum Terebinthinæ, Mistura Camphoræ, Spiritus Camphoræ, Tinctura Camphoræ Composita.

Medicinal Uses.—Stimulant. Dose, gr. v. to gr. x. In the advanced stages of typhoid fever, spasmodic cough, &c., and in embrocations for external application.

MISTURA CRETÆ.

Mixture of Chalk.

Julepum e Cretâ, P.L. 1746.
Mistura Cretacea, P.L. 1788.
Mistura Cretæ, P.L. 1809, P.L. 1824, P.L. 1836.

Take of prepared Chalk half an ounce,
Sugar three drachms,
Mixture of Acacia a fluidounce and a half,
Cinnamon Water eighteen fluidounces;
Mix.

Medicinal Use.—Antacid in diarrhœa. Dose, f℥j. to f℥ij. every three or four hours; its utility is increased when it is combined with opium, catechu, or any other astringent. It is of course incompatible with every acid and acidulous salt.

MISTURA FERRI COMPOSITA.

Compound Mixture of Iron.

Mistura Ferri Composita, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Myrrh, powdered, two drachms,
Carbonate of Potash a drachm,
Rose Water eighteen fluidounces,
Sulphate of Iron, powdered, two scruples and a half,
Spirit of Nutmeg a fluidounce,
Sugar two drachms;

Rub together the Myrrh with the Spirit and the Carbonate, and to these, while rubbing, add first the Rose Water with the Sugar, then the Sulphate. Put the mixture immediately into a glass vessel, and stop it.

Remarks.—This preparation contains carbonate of iron in a state of suspension. Iron in this form is probably more active than when it has become sesquioxide, being then difficultly soluble. This mixture has at first a greenish colour, but the carbonate of iron, to which that is owing, very readily absorbs oxygen from the air, and becomes reddish-yellow sesquioxide.

Mistura Ferri Composita should not be made long before it is wanted for use; for not only is its efficacy diminished by keeping, but, from the different appearances which it presents when recently prepared to those it exhibits when long kept, the patient would naturally suppose that some mistake had occurred in making it.

Process.—In this preparation precisely the same decomposition takes place as in the first stage of preparing the Ferri Sesquioxidum; excepting that, carbonate of potash being used in this case, sulphate of potash is formed, instead of sulphate of soda, as in that process.

Incompatibles.—Acids and acidulous salts, which dissolve the carbonate of iron. Vegetable astringents render it black, and are therefore incompatible with it.

Medicinal Uses.—Astringent. Tonic. Dose, f℥j. to f℥ij. two or three times a day. It is especially recommended in hysteria and chlorosis, and is unquestionably one of the most efficacious preparations of iron.

MISTURA GENTIANÆ COMPOSITA.

Compound Mixture of Gentian.

Mistura Gentianæ Composita, P.L. 1836.

Take of Compound Infusion of Gentian twelve fluidounces,
Compound Infusion of Senna six fluidounces,
Compound Tincture of Cardamom two fluidounces;
Mix.

Medicinal Uses.—Usefully employed in dyspeptic affections accompanied with constipation. Dose, f℥j. to f℥ij.

MISTURA GUAIACI.

Mixture of Guaiacum.

Lac Guaiaci, P.L. 1788.
Mistura Guaiaci, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Guaiacum [*resin*], powdered, three drachms,
Sugar half an ounce,
Acacia, powdered, two drachms,
Cinnamon Water a pint;

Rub the Sugar with the Guaiacum and the Acacia, and to these, while rubbing, add gradually the Cinnamon Water.

Remarks.—In the present Pharmacopœia the resin of Guaiacum is termed simply *Guaiacum.* Dried gum Acacia has been substituted for the Mistura Acaciæ, an advantageous alteration, this mixture often being acid from keeping.

Medicinal Uses.—Stimulant. Diaphoretic. Dose, f℥ss. to f℥ij. two or three times a day.

MISTURA SPIRITUS VINI GALLICI.

Mixture of Spirit of French Wine.

Mistura Spiritus Vini Gallici, P.L. 1836.

Take of Spirit of French Wine [*Brandy*],
Cinnamon Water, each four fluidounces,
The yelks of two Eggs,
Sugar half an ounce,
Oil of Cinnamon two minims;

Mix.

Remarks.—From whatever source alcohol is obtained, it, unless frequently rectified, always retains a peculiar aroma, derived from the liquid submitted to distillation, whether this be wine, fermented cane-juice, or any fermented saccharine solution, and by which aroma its source may be recognised; varieties of the spirit derived from similar sources are easily distinguished by dealers in spirits.

BRANDY is the term applied in England exclusively to spirit distilled from Wine, the best being imported from France. Spirit made in this country from grain, &c., artificially flavoured and sophisticated, is often sold in lieu of, or mixed with genuine brandy, than which however it is probably less wholesome, and certainly less agreeable.

Medicinal Uses.—Stimulant and restorative, and as such employed in the last stage of fever. Dose f℥ss. to f℥jss.

NOTE.—All the Essential "Distilled" Oils employed in the Pharmacopœia are now transferred to MATERIA MEDICA. For Remarks upon the special characteristics of several of these oils, and their general properties, see Section AQUÆ.

PILULÆ.

PILLS.

PILULA ALOES COMPOSITA.

Compound Pill of Aloes.

Pilulæ ex Aloë, P.L. 1788.
Pilulæ Aloës Compositæ, P.L. 1788, edit. alt., P.L. 1809, P.L. 1824, P.L. 1836.

Take of Socotrine Aloes, powdered, an ounce,
Extract of Gentian half an ounce,
Oil of Caraway forty minims,
Treacle as much as may be sufficient;

Beat them together until they are thoroughly incorporated into a mass fit for making pills.

Remarks.—Treacle has in the present Pharmacopœia been directed to be used as the binding material of pills wherever syrup was formerly ordered. I shall reserve any observations upon Treacle until I treat of Sugar.

Medicinal Use.—Purgative. Stomachic, in habitual costiveness. Dose, gr. x. to gr. xx.

PILULA ALOES CUM MYRRHA.

Pill of Aloes with Myrrh.

Pilulæ Ruffi, P.L. 1721.
Pilulæ Rufi, P.L. 1746.
Pilulæ ex Aloë cum Myrrhâ, P.L. 1788.
Pilulæ Aloës cum Myrrhâ, P.L. 1788, edit. alt., P.L. 1809, P.L. 1824, P.L. 1836.

Take of Socotrine, or hepatic Aloes, powdered, half an
ounce,
Saffron [*powdered*],
Myrrh, powdered,
Soft Soap, each two drachms,
Treacle, as much as may be sufficient;
Beat together to form a mass.

Medicinal Use.—This preparation is yet commonly called Pilulæ Rufi, and has been very long in use. Dose, gr. x. to. gr. xx. as a stimulant and cathartic.

Remarks.—The quantities directed in the last Pharmacopœia have been greatly reduced, but the proportions preserved, excepting what is owing to the introduction of the soft soap, by which the proportions of the other drugs are reduced one-fifth.

Soap is made by boiling any oily or fatty substance with a solution of one of the fixed caustic alkalies, soda being used for making common hard or curd soap; potash being employed in the manufacture of soft soap. In this country hard soap is made from tallow mixed with other kinds of fat, whilst in the manufacture of soft soap, fish and seed oils, seldom olive oil, mixed with some tallow, are employed. Olive oil, which is directed in Materia Medica to be used in making both descriptions of soap, is very seldom used in England as the only saponifiable matter employed in this manufacture. The olive oil soap used in this country, principally for medicinal purposes, is made at and imported, for the most part, from Marseilles, under the name of 'Castile soap;' it is met with both white and mottled with red and bluish irregular streaks, the latter of which is usually employed because it 'looks pretty'; the mottling is an intentional adulteration and injures the soap both for medicinal and detergent purposes, so that 'mottled Castile soap' should always be rejected.

The nature of olive oil has already been considered, see Ceratum, p. 133 *et seq.*; when this is acted upon by an alkali the constituents of the oil are separated, and give rise to an alkaline oleate and margarate, together with glycerin, and these two alkaline salts form true soaps, when separated from the glycerin, inactive alkaline salts and a portion of the water employed in their preparation. The same effect is produced when many insoluble or very slightly soluble metallic oxides are employed in lieu of the oxides of potassium and sodium, as oxide of lead in making Emplastrum Plumbi; but in this and almost every similar case, a soap insoluble in water and consequently destitute of detergent properties is obtained.

Properties.—Soda soap or curd soap is too well known to require description. It possesses a peculiar alkaline taste and a slightly greasy feel, both of which are distinguished as *soapy*. It is soluble in alcohol and in water; but more so in the former than in the latter. The spirituous solution is used as an approximative test to determine the quality of water; if 'hard' the soap is curdled, if it be 'soft water' the mixture will probably become opalescent, but does not curdle. Soap is decomposed by the strong acids; stearic, oleic, margaric, phocenic, palmitic, &c., acids being set free according to the fat or description of oil made use of in making the soap. It is also decomposed by most metallic salts with the formation of soluble alkaline salts and insoluble soaps, which are the above saponaceous acids combined with the respective metallic oxides. Soft or potash soap resembles the above in the properties described, chiefly differing from it in its physical characters; it is usually more alkaline and consequently more detergent than hard soap.

Impurities, Adulterations, and Tests.—It has been already mentioned that the description of soft soap ordered in Materia Medica is seldom met with in England; consequently this variety is often adulterated, or rather another article is substituted for the genuine one. A factitious Castile soap is extensively manufactured in London, which exactly resembles, in its much-admired mottling, the genuine soap; when dry, Castile soap should be easily powdered, and should be almost destitute of smell, at any rate of any disagreeable smell. Good soap should have but a slight and not unpleasant smell, and be entirely soluble in rectified spirit.

Incompatibles.—Acids, acidulous and metallic salts, and hard water.

Pharmacopœia Preparations.—Of Hard or Soda Soap, Ceratum Saponis Compositum, Emplastrum Saponis, Linimentum Saponis. Of Potash or Soft Soap, Enema Colocynthidis, Linimentum Terebinthinæ, Pilula Aloës cum Myrrhâ, Pilula Aloës cum Sapone, Unguentum Saponis Compositum.

Medicinal Uses.—Antacid and purgative. Dose, gr. v. to gr. xxx. It is used as a lubricant in liniments, and as a convenient combining substance in making pill masses.

PILULA ALOES CUM SAPONE.

Pill of Aloes with Soap.

Take of Extract of Barbadoes Aloes, powdered,
Soft Soap,
Extract of Liquorice, equal parts,
Treacle as much as may be sufficient;
Pound the Extract of Aloes with the Soap; then, the rest being added, beat the whole together to form a mass.

Remarks.—This preparation has now been inserted in the Pharmacopœia, forming a very excellent mode of exhibiting Aloes, the solubility and the medicinal powers of which are assisted by the soap.

Medicinal Use.—Purgative. Dose, gr. v. to gr. xv.

PILULA CAMBOGIÆ COMPOSITA.

Compound Pill of Gamboge.

Pilulæ Cambogiæ Compositæ, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Gamboge, powdered, two drachms,
Socotrine, or hepatic Aloes, powdered, three drachms,
Ginger, powdered, a drachm,
Soft Soap half an ounce;
Mix the powders together; afterwards, the Soap being added, beat the whole together to form a mass.

Medicinal Use.—Cathartic. Dose, gr. x. to gr. xx.

Remarks.—In the present formula the quantities are double those directed in the last Pharmacopœia, and soft soap has been substituted for hard soap.

GAMBOGE.—The plant from which Gamboge is obtained is yet unascertained: late researches tend to show that it is derived from a species of *Garcinia*, which opinion has been adopted by the College. This drug, in the shape of *lump* or *cake gamboge* and as *pipe gamboge*, is imported from Siam by way of Singapore.

Properties.—Gamboge is inodorous, but occasions sneezing; it is at first tasteless, but soon excites an acrid sensation in the throat. It is very brittle, the fracture is conchoidal and smooth; it is opaque, of a reddish-yellow colour, which is rendered brighter by pulverizing. When gamboge is triturated with water a smooth yellow emulsion is formed, and by filtration a yellow solution is obtained. Rectified spirit dissolves the greater part of it, and by the successive action of ether and water the whole is rendered soluble. When triturated with strong sulphuric acid, neither appears to be decomposed, and on the addition of water a fine bright yellow-coloured solution is obtained. The medicinal virtues of Gamboge reside in the resin.

Gamboge Resin.—This substance is obtained by evaporating the ethereal solution to dryness; it is brittle, in thin layers is of a deep orange colour, and in thicker ones of a cherry-red. It is insoluble in water, soluble in alcohol, and more so in ether; one part communicates a yellowish tint to 10,000 parts of spirit.

Johnstone calls it *gambodic acid*; it is soluble in potash, forming a dark red *gambodiate*, which yields yellow gambodic acid on the addition of a mineral acid; with oxide of lead it forms a yellow compound, and brown gambodiates with the oxides of iron and copper.

Composition.—According to Johnstone, Gambodic Acid consists of

Forty equivalents	of Carbon..	6×40=240	or	73·4
Twenty-three ,,	of Hydrogen	1×23= 23	,,	7·0
Eight ,,	of Oxygen..	8× 8= 64	,,	19·6
	Equivalent......	327.		100·

Formula...... $C^{40} H^{23} O^{8}$.

Impurities, Adulterations, and Tests.—The inferior varieties of the drug contain more foreign matter and consequently less resin than the better descriptions. It is said to be adulterated with gummy and amylaceous matters; the latter are readily detected by treating the drug with water, and allowing the starch, if present, to deposit, treating this residue with hot water, and testing with iodine.

Pharmacopœia Preparation.—Pilula Cambogiæ Composita.

Medicinal Use.—Hydragogue, Cathartic and Antelminthic. Dose, gr. ij. to gr. v. with Aloes or Scammony.

PILULA COLOCYNTHIDIS COMPOSITA.

Compound Pill of Colocynth.

Extractum Catharticum, P.L. 1746.
Extractum Colocynthidis Compositum, P.L. 1788, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Extract of Colocynth a drachm,
Extract of Aloes, powdered, six drachms,
Scammony, powdered, two drachms,
Cardamom [husked], powdered, half a drachm,
Soft Soap a drachm and a half.

Mix the powders together, then the rest being added, beat all together to form a mass.

Remarks.—Hitherto this preparation has been classed amongst Extracts, but it is now transferred to Pills. The quantities have been considerably reduced but the proportions preserved, the alterations being that the extract of colocynth is used in lieu of colocynth pulp, and soft soap has replaced ordinary soap. The spirit of course is omitted, being no longer required to prepare the extract.

Medicinal Uses.—Cathartic. Dose, gr. v. to gr. xxx. It is esteemed to be particularly efficacious when combined with chloride of mercury in relieving habitual costiveness and obstinate visceral obstructions.

PILULA CONII COMPOSITA.

Compound Pill of Conium [*Hemlock.*]

Pilulæ Conii Compositæ, P.L. 1836.

Take of Extract of Conium five drachms,
Ipecacuanha, powdered, a drachm,
Treacle as much as may be sufficient;

Beat them together that they may form a mass.

Remarks.—The only alteration in this preparation is the substitution of treacle for gum-water.

Medicinal Use.—Antispasmodic and slightly narcotic. Of use in hooping-cough and incipient stage of phthisis. Dose, gr. v. three times a day.

PILULA FERRI COMPOSITA.

Compound Pill of Iron.

Pilula Ferri cum Myrrhâ, P.L. 1809.
Pilulæ Ferri Compositæ, P.L. 1809, edit. alt., P.L. 1824, P.L. 1836.

Take of Myrrh, powdered, two drachms,
Carbonate of Soda,
Sulphate of Iron,
Treacle, each a drachm;

Rub the Myrrh with the Carbonate in a vessel previously warmed; then the Sulphate being added, rub them again; afterwards beat the whole together to form a mass.

Remarks.—In this preparation the sulphate of iron is decomposed by the carbonate of soda, precisely in the same manner, and in the first instance, with the production of similar compounds, as in preparing the Ferri Sesquioxidum. While, however, the sulphate of soda is washed away from the sesquioxide of iron, it remains with it in preparing the pills, but the quantity is so small as to be quite unimportant. Nearly the same precautions as those which have been given with respect to the Mistura Ferri Composita, will apply to this preparation; viz. that the pills should be prepared only when they are wanted, for the carbonate of iron at first formed is very readily converted into sesquioxide by absorbing the oxygen of the atmosphere, by which its solubility and power are diminished. The dose is from gr. x. to gr. xx. two or three times a day, in the same cases as the Mistura Ferri Composita.

PILULA GALBANI COMPOSITA.

Compound Pill of Galbanum.

Pilulæ Gummosæ, P.L. 1721, P.L. 1746.
Pilulæ e Gummi, P.L. 1788.
Pilulæ Galbani Compositæ, P.L. 1788, edit. alt., P.L. 1809, P.L. 1824, P.L. 1836.

Take of Prepared Galbanum two drachms,
Myrrh,
Prepared Sagapenum, each three drachms,
Prepared Assafœtida a drachm,
Soft Soap two drachms,
Treacle as much as may be sufficient;
Beat them together to form a mass.

Medicinal Use.—Antispasmodic and emmenagogue. Dose, gr. x. to gr. xx. The quantity ordered to be made is now reduced, and soft soap is introduced, but probably without altering the strength of this preparation, as three of the drugs employed in it are now directed to be used in a purified state.

PILULA HYDRARGYRI.

Pill of Mercury.

Pilulæ Mercuriales, P.L. 1746.
Pilulæ ex Hydrargyro, P.L. 1788.
Pilulæ Hydrargyri, P.L. 1788, edit. alt., P.L. 1809, P.L. 1824, P.L. 1836.

Take of Mercury half an ounce,
Confection of the Red Rose six drachms,
Liquorice [*Root*], powdered, two drachms;

Rub the Mercury with the Confection, until globules can no longer be seen; then, the Liquorice being added, beat the whole together to form a mass.

Remarks.—The mercury in this preparation is probably in the state of minute division only. The proportions of this preparation are unaltered. As met with in commerce it varies considerably in the quantity of mercury it contains, and is frequently adulterated with inert matter.

Medicinal Uses.—It is by far the best form for the internal exhibition of mercury; when it is intended to act upon the system as an alterative, it should be administered in doses of from gr. iv. to gr. vj. Opium may be advantageously given with it, if it should occasion irritation. In doses, from gr. x. to gr. xx. it acts as a mild but efficient purgative.

PILULA HYDRARGYRI CHLORIDI COMPOSITA.

Compound Pill of Chloride of Mercury.

Pilulæ Hydrargyri Submuriatis, P.L. 1809.
Pilulæ Hydrargyri Submuriatis Compositæ, P.L. 1809, edit. alt., P.L. 1824.
Pilulæ Hydrargyri Chloridi Compositæ, P.L. 1836.

Take of Chloride of Mercury,
Oxysulphuret of Antimony, each two drachms,
Guaiacum [*Resin*], powdered,
Treacle, each half an ounce;

Rub the Chloride with the Oxysulphuret, afterwards with the Guaiacum and the Treacle until a mass is formed.

Remarks.—The quantity of treacle ordered is now doubled, consequently this preparation is reduced in strength one-sixth. It contains one grain of chloride of mercury in six grains of the mass.

Medicinal Uses.—Alterative. Dose, gr. v. to gr. x. This pill is much employed in cutaneous eruptions, and in secondary syphilitic symptoms, particularly when affecting the skin. It is commonly known by the name of *Plummer's Pill.*

PILULA IPECACUANHÆ CUM SCILLA.

Pill of Ipecacuanha with Squill.

Pilulæ Ipecacuanhæ Compositæ, P.L. 1836.

Take of Compound Powder of Ipecacuanha three drachms,
Squill, recently powdered,
Ammoniacum, powdered, each a drachm,
Treacle as much as may be sufficient ;
Beat them together to make a mass.

Medicinal Uses.—Sudorific and narcotic. Dose, gr. v. three times a day, or gr. x. at night. Treacle is now directed to be used instead of gum-water.

PILULA RHEI COMPOSITA.

Compound Pill of Rhubarb.

Pilulæ Rhei Compositæ, P.L. 1836.

Take of Rhubarb, powdered, four drachms,
Socotrine Aloes, powdered, three drachms,
Myrrh, powdered, two drachms,
Soft Soap half a drachm,
Oil of Caraway fifteen drops,
Treacle as much as may be sufficient ;

Mix the Powders together; then, the remaining materials being added, beat the whole together to form a mass.

Medicinal Use.—Slightly aperient or laxative. Dose, gr. x. to gr. xx. The quantity ordered to be made is reduced one-half, and soft soap and treacle are substituted for hard soap and syrup.

PILULA SAPONIS COMPOSITA.

Compound Pill of Soap.

Pilulæ Saponaceæ, P.L. 1746.
Pilulæ ex Opio, P.L. 1788.
Pilulæ Opii, P.L. 1788, edit. alt.
Pilulæ Saponis cum Opio, P.L. 1809, P.L. 1824.
Pilulæ Saponis Compositæ, P.L. 1836.

Take of Opium, powdered,
Liquorice [*Root*], powdered, each two drachms,
Soft Soap six drachms;
Beat them together to form a mass.

Remarks.—Liquorice powder is now employed in this preparation, and soft instead of hard soap, but there is no alteration in strength.

Medicinal Uses.—Anodyne. Narcotic. Dose, gr. iij. to gr. x. Five grains contain one grain of opium.

PILULA SCILLÆ COMPOSITA.

Compound Pill of Squill.

Pilulæ e Scillâ, P.L. 1788.
Pilulæ Scillæ, P.L. 1788, edit. alt.
Pilulæ Scillæ Compositæ, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Squill, recently powdered, a drachm,
Ginger, powdered,
Ammoniacum, powdered, each two drachms,
Soft Soap three drachms,
Treacle a drachm;

Mix the Powders together; then, the rest being added, beat them all together to form a mass.

Medicinal Uses.—Expectorant. Diuretic. Dose, gr. x. to gr. xx. This preparation is unaltered, excepting as regards the soft soap and treacle, now used in lieu of hard soap and syrup.

PILULA STYRACIS COMPOSITA.

Compound Pill of Storax.

Pilulæ e Styrace, P.L. 1721, P.L. 1746.
Pilulæ Styracis Compositæ, P.L. 1836.

Take of prepared Storax, six drachms,
Opium, powdered,
Saffron, powdered, each two drachms;

Beat them together to form a mass.

Medicinal Uses.—Balsamic and slightly expectorant in chronic affections of the lungs. Dose, gr. iij. to gr. x. Five grains contain one grain of opium.

PULVERES.

POWDERS.

It is requisite that whatsoever we have directed to be reduced to powder should be passed through a fine sieve, so that the refuse and coarser portions may be separated. Most powders should be recently prepared; not kept for a long time.

Remarks.—By sifting, not merely is the ligneous matter, &c. separated, but the powders are accurately intermixed. Most drugs of vegetable origin, as Aloes, Acacia-gum, Opium, should be dried by a very gentle and long-continued heat before powdering, unless their activity depends upon an essential oil: many of these, *ex. gr.* cinnamon, are imported sufficiently free from moisture to be readily pulverized without previous drying. There are some cases in which the addition of a few drops of olive oil, as with aloes, or of rectified spirit, as with many hard extracts, greatly facilitates their pulverization, without in any way injuring the medicinal properties of the drug.

PULVIS ALOES COMPOSITUS.

Compound Powder of Aloes.

Pulvis Aloëticus cum Guaiaco, P.L. 1788.
Pulvis Aloës cum Guaiaco, P.L. 1788, edit. alt.
Pulvis Aloës Compositus, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Socotrine or hepatic Aloes an ounce and a half,
Guaiacum [*Resin*] an ounce,
Compound powder of Cinnamon half an ounce;

Rub the Aloes and the Guaiacum separately to powder; then mix with the Compound Powder of Cinnamon.

Medicinal Uses.—This powder is cathartic and sudorific. Dose, gr. x. to gr. xx.

PULVIS CINNAMOMI COMPOSITUS.

Compound Powder of Cinnamon.

Species Diambræ sine Odoratis, P.L. 1721.
Species Aromaticæ, P.L. 1746.
Pulvis Aromaticus, P.L. 1788.
Pulvis Cinnamomi Compositus, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Cinnamon two ounces,
Cardamom an ounce and a half,
Ginger an ounce,
Long Pepper half an ounce;
Rub them together, so that a very fine powder may be made.

Medicinal Uses.—This preparation is stimulant and carminative. Dose, gr. v. to gr. x. in the form of bolus, or mixed with water. It is generally employed to give warmth to more active remedies.

PULVIS CRETÆ COMPOSITUS.

Compound Powder of Chalk.

Pulvis e Bolo Compositus sine Opio. Species e Scordio sine Opio, P.L. 1746.
Pulvis e Cretâ Compositus, P.L. 1788.
Pulvis Cretæ Compositus, P.L. 1788, edit. alt., P.L. 1809, P.L. 1824, P.L. 1836.

Take of Prepared Chalk half a pound,
Cinnamon four ounces,
Tormentil,
Acacia, each three ounces,
Long Pepper half an ounce;
Rub them separately to very fine powder; then mix.

Medicinal Uses.—Astringent and antacid. Dose, gr. v. to gr. xxx.

PULVIS CRETÆ COMPOSITUS CUM OPIO.

Compound Powder of Chalk with Opium.

Pulvis e Bolo Compositus cum Opio. Species e Scordio cum Opio, P.L. 1746.
Pulvis e Cretâ Compositus cum Opio, P.L. 1788.
Pulvis Cretæ Compositus cum Opio, P.L. 1788, edit. alt., P.L. 1809, P.L. 1824, P.L. 1836.

Take of Compound Powder of Chalk six ounces and a half.
Opium, powdered, four scruples;
Mix.

Medicinal Uses.—Astringent. Anodyne. Dose, gr.v.to gr. xxx. Forty grains contain one grain of opium. This and the former preparation, on account of the carbonate of lime which they contain, are incompatible with acids and acidulous salts.

PULVIS JALAPÆ COMPOSITUS.

Compound Powder of Jalap.

Pulvis Jalapæ Compositus, P.L. 1836.

Take of Jalap three ounces,
Bitartrate of Potash six ounces,
Ginger two drachms;
Rub them separately to powder; then mix.

Medicinal Use.—Purgative. Dose, gr. xx. to gr. xl.

PULVIS IPECACUANHÆ COMPOSITUS.

Compound Powder of Ipecacuanha.

Pulvis Ipecacuanhæ Compositus, P.L. 1788, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Ipecacuanha, powdered,
Opium, powdered, each a drachm,
Sulphate of Potash, powdered, an ounce;
Mix.

Remarks.—This powder has been long employed as a sudorific, under the name of Dover's Powder. The sulphate of potash is used merely to divide the more active ingredients. In doses of gr. v. to gr. xx. it acts as a powerful sudorific; it may be given diffused in a mucilaginous fluid, or in the form of bolus. Ten grains contain one grain of opium.

Ipecacuanha is the root of a perennial plant belonging to the natural family *Cinchonaceæ*. This drug is imported from Brazil in bundles consisting of pieces of three to six inches long, about the thickness of a goose-quill, and of a grey ashy-brown colour, irregularly twisted, and annulated.

The active powers of ipecacuanha reside in a peculiar alkaloid, to which the name of *Emetina* has been given; when pure, this is pulverulent, inodorous, with a slightly bitter taste; fusible at 122°; it is very slightly soluble in cold water, much more soluble in hot; readily dissolved by alcohol, but scarcely at all in ether or in oil. It restores the blue colour of reddened litmus and dissolves in acids, but without entirely destroying their acidity; the salts which it yields are consequently slightly acid; they crystallize easily, are for the most part soluble in water, and possess an acrid bitter taste.

Tincture of Galls precipitates a solution of emetina copiously, as it does of morphia, but emetina is not acted upon by the salts of iron as morphia is.

According to the analysis of MM. Dumas and Pelletier, emetina consists of nearly

Thirty-five	equivalents	of Carbon	6×35=	210	or	65·42
Twenty-five	,,	of Hydrogen	1×25=	25	,,	7·78
One	,,	of Nitrogen		14	,,	4·37
Nine	,,	of Oxygen	8× 9=	72	,,	22·43
		Equivalent		321.		100·

Formula. . . . . $C^{35} H^{25} N O^{9}$.

Adulterations, &c.—Ipecacuanha is not subject to adulteration unless purchased in powder, its very peculiar and distinctive characters, for which see MATERIA MEDICA, *Ipecacuanha*, proving an obstacle to the successful sophistication of this drug.

Incompatibles.—All preparations containing Tannic Acid.

Pharmacopœia Preparations.—Pilula Conii Composita, Pulvis Ipecacuanhæ Compositus, Vinum Ipecacuanhæ.

Medicinal Uses.—Sudorific in small doses. Emetic in doses of gr. x. to gr. xx. For an infant gr. j. is generally sufficient for an emetic.

As this is the preparation in which SULPHATE OF POTASH is ordered to be used, I have deferred the consideration of this salt till the present opportunity, rather than insert it under the Preparations of Potassium.

POTASSÆ SULPHAS, P.L. 1836.

Sulphate of Potash.

Tartarum Vitriolatum, P.L. 1721.
Tartarum Vitriolatum. Nitrum Vitriolatum, P.L. 1746.
Kali Vitriolatum, P.L. 1788.
Potassæ Sulphas, P.L. 1809, P.L. 1824.

Take of the Salt which remains after the distillation of Nitric Acid two pounds,
Water, boiling, two gallons ;

Ignite the Salt in a crucible until the excess of Sulphuric Acid is entirely expelled, then boil it in the two gallons of Water until a pellicle floats, and the liquor being strained, set it aside that crystals may be formed. The liquor being poured off, dry them.

Process.—It has been already explained that the salt remaining after the distillation of nitric acid is composed of bisulphate of potash and water; the excess of acid is economically directed to be expelled by heat instead of being saturated by the addition of carbonate of potash.

Properties.—This salt is colourless, inodorous, bitter and rather hard; water at 60° dissolves only one-sixteenth of its weight, but boiling water a much larger quantity; it is insoluble in alcohol.

It suffers no change by exposure to the air. When subjected to a strong heat it merely decrepitates, losing but little weight, for it contains no water of crystallization.

The primary form of this salt is a *right rhombic prism*; M M′ and P are primary planes.

Fig. 1.

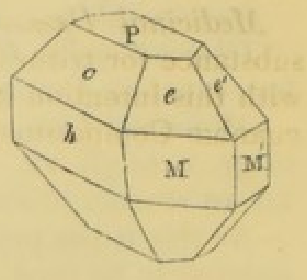


Fig. 1 is a single modified crystal.

M on M′	120° 30′
M on *h*	120 45
M on *e*	146 22
h on *c*	146 10
e on *e*′	131 12

Fig. 2.

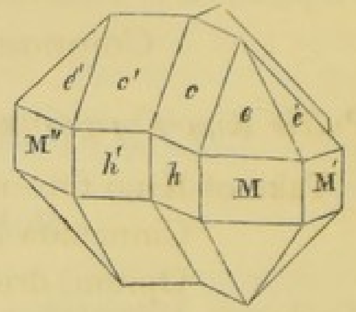


Fig. 2. is the compound crystal, which consists of three single crystals, so united that their upper edges meet at angles of 120°, and consequently the planes of junction incline to each other at the same angle. Hence

M on M″	119° 30′
e on *e*″	130 24

Fig. 3.

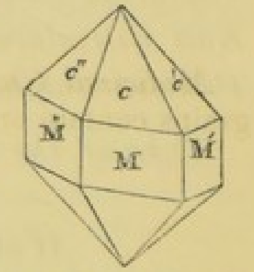


Fig. 3. is one of the common bi-pyramidal crystals, whose relation to the preceding figures may be perceived from the corresponding letters on the planes.

The union of these three crystals takes place at an angle of 120°.

Composition.—This salt is composed of

One equivalent of Potash	48	or 54·55
One " of Sulphuric Acid	40	" 45·45
Equivalent	88.	100·

Formula...... KO, SO^3.

Potash combines with sulphuric acid in two other definite proportions, forming the Sesquisulphate and Bisulphate of Potash, the latter of which was inserted in the Pharmacopœias of 1809, 1824, and 1836, but is now omitted.

Adulteration, Impurities, and Tests.—This salt is so extremely cheap, and in its crystalline state any mixture would be so obvious, that adulteration is hardly to be suspected. See MATERIA MEDICA: *Potassæ Sulphas.*

Incompatibles.—The solution of this salt is decomposed by tartaric acid, which forms crystals of bitartrate of potash; by chloride of barium, barytes water, and chloride of calcium, but not by lime-water, as has been asserted; it also decomposes the solutions of acetate and diacetate of lead.

Pharmacopœia Preparation.—Pulvis Ipecacuanhæ Compositus.

Medicinal Uses.—On account of its hardness it is an eligible substance for triturating with other bodies and dividing powders; with this intention it enters into the composition of Pulvis Ipecacuanhæ Compositus.

PULVIS KINO COMPOSITUS.

Compound Powder of Kino.

Pulvis Kino Compositus, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Kino fifteen drachms,
Cinnamon half an ounce,
Opium, dried, a drachm;
Rub them separately to very fine powder; then mix.

Medicinal Use.—Astringent. Dose, gr. v. to gr. xx. Twenty grains contain one grain of opium.

PULVIS SCAMMONII COMPOSITUS.

Compound Powder of Scammony.

Pulvis Comitis Warwicensis, P.L. 1721.
Pulvis e Scammonio Compositus, P.L. 1746, P.L. 1788.
Pulvis Scammonii Compositus, P.L. 1788, edit. alt.
Pulvis Scammoneæ Compositus, P.L. 1809, P.L. 1824.
Pulvis Scammonii Compositus, P.L. 1836.

Take of Scammony,
Hard Extract of Jalap, each two ounces,
Ginger half an ounce;
Rub them separately to very fine powder; then mix.

Medicinal Use.—Cathartic. Dose, gr. v. to gr. xx.

Remarks.—SCAMMONY is a gum-resin obtained from a plant belonging to the natural family *Convolvulaceæ*, and imported from the Levant. The best scammony, "Virgin Scammony," occurs in moderately-sized amorphous masses, which are porous, brittle, and externally of an ash-grey colour; when broken the colour is dark olive-green, and the fracture is conchoidal and resinous, with a peculiar smell, especially when breathed upon, and acrid nauseous taste. Scammony, as usually met with, is heavier than virgin scammony, and its fracture earthy and dull. The composition of scammony greatly varies, for it is almost always imported in an adulterated state. Its medicinal powers depend upon a substance which may be obtained from its ethereal solution as a transparent and colourless resin. Its alcoholic solution exhibits a feeble acid reaction, and from this water precipitates it as a hydrate of the resin. It is composed of

Forty equivalents of Carbon	$6 \times 40 = 240$	or	55·4
Thirty-three „ of Hydrogen	$1 \times 33 = 33$	„	7·6
Twenty „ of Oxygen	$8 \times 20 = 160$	„	37·0
Equivalent	433.		100·

Formula...... $C^{40} H^{33} O^{20}$.

Adulteration, Impurities, and Tests.—The adulterants of scammony are very numerous; chalk, starch, flour, ashes, fine sand, gypsum, &c., from one or the other of which very few specimens are free, the quantity of resinous extract yielded by this drug, when treated with rectified spirit, varying from 85 to 5 per cent. The quantity of resin it contains affords a good estimate of its medicinal powers, and were such a preparation inserted in the Pharmacopœia, and directed to be employed in lieu of the crude drug, the action of this valuable medicine would be more uniform and more to be relied upon by the physician than it is at the present time. Good Aleppo scammony should yield from 60 to 80 per cent. of resinous extract. For tests, see MATERIA MEDICA: *Scammonium.*

Pharmacopœia Preparations.—Confectio Scammonii, Pilula Colocynthidis Composita, Pulvis Scammonii Compositus.

Medicinal Uses.—Cathartic, in some kinds of dropsy, and apoplexy. It is a useful purgative for children, when combined with other drugs. Dose for an adult, gr. vi. to gr. xx., according to quality.

PULVIS TRAGACANTHÆ COMPOSITUS.

Compound Powder of Tragacanth.

Species Diatragacanthæ Frigidæ, P.L. 1721.
Pulvis e Tragacanthâ Compositus, P.L. 1746, P.L. 1788.
Pulvis Tragacanthæ Compositus, P.L. 1788, edit. alt.,
P.L. 1809, P.L. 1824, P.L. 1836.

Take of Tragacanth, powdered,
Acacia, powdered,
Starch, each an ounce and a half,
Sugar three ounces;

Rub the Starch and Sugar together to powder; then the Tragacanth and Acacia being added, mix them all.

Medicinal Use.—Demulcent. Dose, gr. x. to ʒj.

Remarks.—Tragacanth is the gummy exudation from various trees belonging to the natural family *Leguminosæ*, growing in Asia Minor and some of the islands of the Levant. It occurs in broad, thin, wavy, yellowish-white, semitransparent flakes or strips; it is inodorous and almost tasteless, yielding a thicker and much less transparent mucilage with water than the acacia gum. It usually consists of about 57 per cent. of *arabin*, or gum soluble in cold water, and 43 per cent. of *bassorin*, a gum insoluble in cold water. Arabin has been already described under Mistura Acaciæ.

Bassorin exists, perhaps slightly modified, in many other vegetable products besides gum-tragacanth, and forms the viscid mucilage which these substances yield when treated with water, as salep gum, the gums of the cherry and varieties of plum, gum senegal, &c. By an analysis of Guérin-Varry it would appear that bassorin contains two equivalents less Carbon than exist in arabin, its formula being in this view $C^{10}H^{11}O^{11}$, but I am far more disposed to regard it as arabin in a transition state, into which substance it appears to be converted by long boiling with water. It is highly probable that starches, sugars, gums, mucilages, &c. have all one common basis, and are convertible and indeed converted by the plant into *lignin* or ligneous fibre, so that to multiply varieties and names, serves but too often to create imaginary distinctions where no real differences exist.

Gum Tragacanth should be thoroughly dried, and powdered whilst warm; if the mortar be also warmed to about 120° the pulverization is greatly facilitated.

Adulteration, &c.—Tragacanth is not likely to be adulterated if purchased in flakes; the powdered gum is extensively sophisticated with flour, starch, &c. By exposure to a bright red heat with free access of air it should be almost entirely dissipated.

Pharmacopœia Preparations.—Confectio Opii, Pulvis Tragacanthæ Compositus.

SPIRITUS.

SPIRITS.

Remarks.—Spirit of Wine, which is alcohol diluted with water, is employed in pharmacy for various important purposes, and of different degrees of strength, according to circumstances. In its concentrated state it is termed *alcohol*, and may be prepared by the process given below. Alcohol was inserted in the last Pharmacopœia as well as the three preceding ones, but is now omitted, not being employed when undiluted in medicine, nor in making any of the pharmacopœia preparations; but as it is at times useful for various chemical purposes, I shall reinsert the process for obtaining it. When diluted with a small proportion of water, it is called *rectified Spirit*; and when more largely diluted, *proof spirit*: these are articles of the Materia Medica.

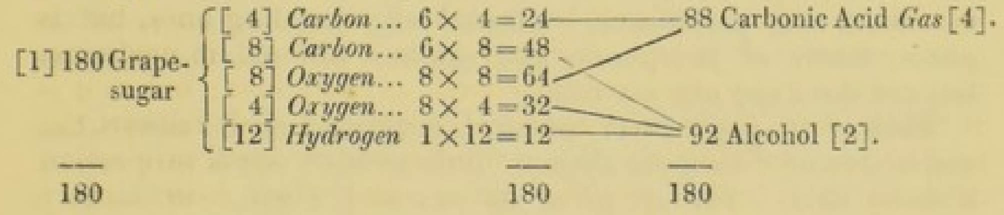
Several aromatic preparations in which Spirit is used in the Pharmacopœia, are classed together under the title of *Spiritus. Tincturæ and Ætherea* are the two other classes.

Alcohol, mixed with various proportions of water, is obtained by distilling the fermented saccharine juices of vegetables, fruits, and grain, or fermented milk. In this country an aqueous infusion of malted grain is fermented, mixed with various amylaceous grains and tubers, the starch of which is converted into sugar, at temperatures of 140° to 150°, by the action of *diastase*, a peculiar saccharifying principle existing in malt, and when the sugar is converted, as completely as possible, into alcohol, the fermented liquor is distilled, and the product when "rectified" or redistilled, yields the spirit which under various names is so extensively consumed in this country. The process of distillation simply frees the spirit from the large quantity of water and vegetable matter with which it is mixed in the fermented liquor; it being more volatile than water the spirit rises in vapour at lower temperatures than the water, and these vapours, when condensed, yield "spirit of wine" in a concentrated form. The transformations of starch into sugar, and of sugar into alcohol are however so interesting as to render a short sketch of these conversions desirable. When starch is acted on by the infusion of the malt, it appears to be first converted into a soluble gummy substance, called *dextrin*, possessing, when in solution, precisely the same composition as starch, and by the continued action of the diastase contained in the malt, this dextrin is rapidly changed into *starch-* or *grape-sugar* by combining with the elements of two eqs. of water, thus :—

One equivalent of Starch consists of $C_{12}\ H_{10}\ O_{10}$.
Two „ of Water „ of $H_2\ O_2$.

One „ of GRAPE-SUGAR of $C_{12}\ H_{12}\ O_{12}$.

Now it is probable that sugar, from whatever source it is obtained, is invariably converted into grape-sugar previously to the formation of alcohol, which is formed when a ferment, yest, is added to a solution of this grape-sugar, and the mixture kept at a temperature of about 70° to 80°, carbonic acid gas being evolved at the same time; one eq. of grape-sugar 180, producing four eqs. of carbonic acid 88, and two eqs. of alcohol 92, as will be seen by the following diagram :—



ALCOHOL, P.L. 1836.

Alcohol.

Alkohol, P.L. 1788.
Alcohol, P.L. 1809, P.L. 1824.

Take of Rectified Spirit a gallon,
Chloride of Calcium a pound;

Put the Chloride of Calcium into the Spirit, and when it is dissolved, let seven pints and five fluidounces distil.

Remarks.—Rectified Spirit, according to the table of Lowitz, consists of about 84 parts of absolute alcohol and 16 parts of water. This, when diluted according to the directions of the College, see Materia Medica, *Spiritus Rectificatus*, forms "Proof Spirit, P.L.," which is composed of 49 parts of absolute alcohol and 51 parts of water.

Process.—Chloride of Calcium has a great affinity for water, and it is also soluble in spirit; when this solution is subjected to distillation, the chloride remains in the retort with nearly the whole of the water.

Properties.—Alcohol, when pure, is colourless and transparent; its odour is rather pleasant, and its taste burning and penetrating. It has never been rendered solid by exposure to any degree of cold, either natural or artificial. Alcohol is that part of fermented liquors from which their intoxicating power is derived. It is extremely volatile, producing great cold during its evaporation. It is highly inflammable, and during combustion, water and carbonic acid are generated, the quantity of the former exceeding that of the weight of alcohol burned.

Alcohol dissolves the hydrates of potash and soda, the alkaline sulphurets, and all the deliquescent inorganic salts, excepting carbonate of potash, which salt was formerly employed in the preparation of alcohol; the efflorescent inorganic salts, which are insoluble, or but slightly soluble in water, are generally insoluble in this menstruum. With many of the salts which it dissolves alcohol forms definite crystalline compounds termed by Graham *Alcoates*, *ex. gr.* with Chloride of Calcium, the formula of which salt is $CaCl, 2C^4 H^6 O^2$. The alcoates resemble the *hydrates*, but are much less permanent. Alcohol also dissolves many of the gases, traces of phosphorus and sulphur, and also the essential, but not the fixed oils nor fats.

Alcohol of sp. gr. 7·947, which is presumed to be anhydrous, and is termed "absolute alcohol," boils at 168°, and is very expansible by heat. The sp. gr. of its vapour is 1·598. When it is mixed with water, heat is evolved, the capacity of the compound for heat being less than that of its ingredients; and the mixture occupies considerably less space than the water and alcohol do when separate; the greatest condensation takes place when 50 measures of alcohol are mixed with 54 of water, the mixture occupying 100 measures.

Alcohol preserves animal substances which are immersed in it from decay; and hence its use in the conservation of anatomical preparations. Its solvent power is in many cases very great, and on this account it is often employed in pharmacy, especially in the preparation of the tinctures of those substances which are resinous, and consequently insoluble in water. It is also largely employed in the preparation of the different descriptions of ether.

Alcohol has been represented as a hydrate of olefiant gas, $2C^2H^2HO$, but this view is no longer tenable. For the composition and further description of Alcohol, see ACETUM, pp. 43, 44, and ÆTHEREA, pp. 76–91.

SPIRITUS AMMONIÆ AROMATICUS.

Aromatic Spirit of Ammonia.

Spiritus Salis Volatilis Oleosus, P.L. 1721.
Spiritus Volatilis Aromaticus, P.L. 1746.
Spiritus Ammoniæ Compositus, P.L. 1788.
Spiritus Ammoniæ Aromaticus, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Hydrochlorate of Ammonia six ounces,
Carbonate of Potash ten ounces,
Cinnamon, bruised,
Clove, bruised, each two drachms and a half,
Lemon Peel five ounces,
Rectified Spirit,
Water, each four pints;
Mix, and let six pints distil.
The specific gravity of this preparation is ·918.

Remarks.—This preparation is now restored to the standard of the Pharmacopœias of 1809 and 1824, being one-sixth stronger, excepting as regards spirit, than the Spiritus Ammoniæ Aromaticus of the last Pharmacopœia.

Process.—In this operation the hydrochlorate of ammonia is decomposed, as already described when treating of Ammoniæ Sesquicarbonas; in the present case, however, chloride of potassium is formed instead of chloride of calcium, because carbonate of potash is substituted for carbonate of lime, and no ammonia escaping, the carbonate of ammonia is a neutral, instead of a sesquicarbonate. This is also the case with the Spiritus Ammoniæ Fœtidus. This Carbonate of Ammonia is composed of

One equivalent of Ammonia	17	or 43·5
One „ of Carbonic Acid ..	22	„ 56·5
Equivalent......	39.	100·

Formula...... NH^3, CO^2.

As this carbonate contains only two-thirds as much carbonic acid as that procured by the use of carbonate of lime, the greater pungency of Spiritus Ammoniæ Aromaticus, than of Liquor Ammoniæ Sesquicarbonatis, is readily accounted for.

Properties.—Spiritus Ammoniæ Aromaticus is a transparent, colourless fluid ; its smell is pungent and its taste acrid ; it turns turmeric brown, indicating its alkaline properties. It is rendered agreeable by the aromatics, whether applied to the nostrils or internally exhibited.

Incompatibles.—Acids, acidulous salts, earthy and metallic salts, and lime-water.

Officinal Preparations.—Tinctura Colchici Composita, Tinctura Guaiaci Composita, Tinctura Valerianæ Composita.

Medicinal Use.—Stimulant in languors and flatulent colic. Dose, f℥ss. to f℥j. in water.

SPIRITUS AMMONIÆ FŒTIDUS.

Fetid Spirit of Ammonia.

Spiritus Volatilis Fœtidus, P.L. 1746.
Spiritus Ammoniæ Fœtidus, P.L. 1788, P.L. 1809,
P.L. 1824, P.L. 1836.

Take of Hydrochlorate of Ammonia ten ounces,
Carbonate of Potash sixteen ounces,
Rectified Spirit,
Water, each three pints,
Assafœtida five ounces;
Mix; then with a slow fire let three pints distil.
The specific gravity of this preparation is ·861.

Properties.—Colourless, pungent, and, as its name expresses, fetid. By long keeping it acquires a brownish colour.

Incompatibles.—The same as with the last preparations.

Medicinal Uses.—Stimulant. Antispasmodic. Dose, f℥ss. to f℥j. in water.

SPIRITUS ANISI.

Spirit of Anise.

Spiritus Anisi, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Oil of Anise three fluidrachms,
Proof Spirit a gallon;
Dissolve.

Medicinal Uses.—Stimulant and carminative in flatulent colic, &c. Dose, fʒij. to fʒiv. in water.

Remarks.—Both this and the following preparations in this section are now frequently made by dissolving the essential oils in spirit instead of subjecting the seed or fruit to distillation with water and spirit.

ANISE is a plant belonging to the natural family *Umbelliferæ*, which grows wild in Egypt and the Levant, and is cultivated in various countries on the continent of Europe; the fruit, *aniseed*, is chiefly imported from Germany and Alicant, the latter is preferred; it is smaller and more compact than the former. Aniseed is small, oblong, striated, and of a dingy green colour, the odour is peculiar and aromatic, and the taste warm and sweetish.

Oleum Anisi.—The essential oil obtained by distillation with water is usually imported from Spain; it is colourless or slightly yellowish, which colour it also acquires by keeping: its odour and taste are similar to those of aniseed.

Its specific gravity is about 0·985; it concretes at 50° and does not liquefy again below 62°; in alcohol it dissolves in all proportions.

Like the other essential oils it is composed of two oils, a camphor which is solid, and an oil which is liquid at ordinary temperatures, the proportions of which are subject to variation; they are isomeric, both possessing similar properties and composition.

The camphor is obtained by pressing the cooled oil between folds of blotting-paper; it is a white crystalline solid, fusible at 64°, and boils, evaporating totally at 435°; by long keeping it becomes liquid.

When the camphor, or solid portion of oil of anise, is acted upon by dilute nitric acid, it yields *anisic acid*, which occurs in acicular crystals, and combines with bases, and hydruret of *anisyl*; if the former be heated with lime, an oil called *anisol* is produced, and sulphuric acid converts the camphor into *anisoïn*, a solid white substance infusible at 212°, which is isomeric with the camphor; other compounds are also formed by the action of reagents upon oil of anise, for which I refer to chemical authors.

Essential oil of Anise, with which both its camphor and oil are isomeric, consists of—

Twenty	equivalents of Carbon	6×20=120 or	81·08
Twelve	,, of Hydrogen ..	1×12= 12 ,,	8·11
Two	,, of Oxygen	8× 2= 16 ,,	10·81
	Equivalent......	148.	100·

Formula...... $C^{20} H^{12} O^{2}$.

Adulterations, &c.—This oil is stated to be adulterated with oil of "star-anise," which is sometimes sold for that of anise. Oil of anise concretes at 50°, whilst oil of star-anise is liquid at 35°. Spermaceti is added to the adulterated oil to give it solidity. This may be detected by its insolubility in cold alcohol. See note at the end of Section AQUÆ.

Pharmacopœia Preparations.—The oil is used in Spiritus Anisi, and Tinctura Camphoræ Composita.

Medicinal Uses of both the seed and oil, the same as Spiritus Anisi.

SPIRITUS ARMORACIÆ COMPOSITUS.

Compound Spirit of Horseradish.

Aqua Raphani Composita, P.L. 1721, P.L. 1746.
Spiritus Raphani Compositus, P.L. 1788.
Spiritus Armoraciæ Compositus, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Horseradish, sliced,
Orange peel, dried, each twenty ounces,
Nutmegs, bruised, five drachms,
Proof Spirit a gallon,
Water two pints;
Mix; then with a slow fire let a gallon distil.

Remarks.—It has been already mentioned, see p. 130, that the Essential oil of Horseradish is isomeric with the oils of Black Mustard, Assafœtida, and Garlic, and their composition is there given; the distinguishing characteristic of this class of oils being the presence of sulphur as a constituent. Unlike the Essential oil of Mustard, that of Horseradish exists ready formed in the plant, and 100 lbs. of the sliced root yield about 7 drachms of crude oil. The virtues of horseradish depend wholly upon this essential oil. Its specific gravity is 1·01, its scent resembles that of oil of mustard, and like it, its vapour makes the eyes water; when dropped on the skin it burns and blisters; it is soluble in alcohol and in ether, and very slightly so in water. Its reactions with nitric acid, ammonia, &c., are identical with those of oil of mustard with these reagents, so that it is highly probable that these two oils are not merely isomeric, but identical.

Incompatibles.—All metallic salts, precipitable by hydrosulphuric acid, such as those of lead and silver.

Pharmacopœia Preparations.—Infusum Armoraciæ Compositum, Spiritus Armoraciæ Compositus.

Medicinal Uses of the Root. As a general stimulant and diaphoretic. Dose, gr. xxx.; of the Spirit, f℥ij. to f℥iv.

SPIRITUS CAMPHORÆ.

Spirit of Camphor.

Spiritus Vini Camphoratus, P.L. 1721.
Spiritus Vinosus Camphoratus, P.L. 1746.
Spiritus Camphoratus, P.L. 1788.
Spiritus Camphoræ, P.L. 1809, P.L. 1824.
Tinctura Camphoræ, P.L. 1836.

Take of Camphor five ounces,
Rectified Spirit two pints;
Dissolve.

Remarks.—This preparation is now restored to its former position among the Spirits.

Incompatibles.—Water and all aqueous solutions.

Medicinal Uses.—Stimulant. It is only used externally. It is frequently applied to chilblains, and in cases of chronic rheumatism and numbness.

SPIRITUS CARUI.

Spirit of Caraway.

Aqua Seminum Carui, P.L. 1746.
Spiritus Carui, P.L. 1788, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Oil of Caraway two fluidrachms,
Proof Spirit a gallon ;
Dissolve.

Medicinal Uses.—Carminative. Stimulant. Dose, fʒij. to fʒiv.

SPIRITUS CINNAMOMI.

Spirit of Cinnamon.

Aqua Cinnamomi Fortis, P.L. 1721.
Aqua Cinnamomi Spirituosa, P.L. 1746.
Spiritus Cinnamomi, P.L. 1788, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Oil of Cinnamon two fluidrachms,
Proof Spirit a gallon ;
Dissolve.

Remarks.—Simple solution of the oil in the spirit is now ordered in lieu of an useless distillation.

Pharmacopœia Preparation.—Infusum Digitalis.

Medicinal Uses.—Stomachic. Stimulant. Dose, fʒij. to fʒiv.

SPIRITUS JUNIPERI COMPOSITUS.

Compound Spirit of Juniper.

Aqua Juniperi Composita, P.L. 1746.
Spiritus Juniperi Compositus, P.L. 1788, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Oil of Juniper a fluidrachm and a half,
Oil of Caraway,
Oil of Fennel, each twelve minims,
Proof Spirit a gallon;
Dissolve.

Medicinal Uses.—Stimulant. Diuretic. Dose, fʒij. to fʒiv. It is principally exhibited with other diuretics, as digitalis, &c.

SPIRITUS MENTHÆ PIPERITÆ.

Spirit of Peppermint.

Aqua Menthæ Piperitidis Spirituosa, P.L. 1746.
Spiritus Menthæ Piperitidis, P.L. 1788.
Spiritus Menthæ Piperitæ, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Oil of Peppermint three fluidrachms,
Proof Spirit a gallon;
Dissolve.

Medicinal Uses.—Stimulant. Carminative. Dose, fʒij. to fʒiv.

SPIRITUS MENTHÆ VIRIDIS.

Spirit of Green Mint [*Spearmint*].

Aqua Menthæ Vulgaris Spirituosa, P.L. 1746.
Spiritus Menthæ Sativæ, P.L. 1788.
Spiritus Menthæ Viridis, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Oil of Green Mint [Spearmint] three fluidrachms,
Proof Spirit a gallon;
Dissolve.

Medicinal Uses and dose same as the Spirit of Peppermint.

SPIRITUS MYRISTICÆ.

Spirit of the Nutmeg.

Aqua Nucis Moschatæ, P.L. 1746.
Spiritus Nucis Moschatæ, P.L. 1788.
Spiritus Myristicæ, P.L. 1788, edit. alt., P.L. 1809, P.L. 1824, P.L. 1836.

Take of the Nutmeg, bruised, two ounces and a half,
Proof Spirit a gallon,
Water a pint;
Mix; then with a slow fire let a gallon distil.

Medicinal Uses and dose same as the Spirit of Peppermint.

Remarks.—The NUTMEG is the kernel of the fruit of a tree growing in the Moluccas, belonging to the natural family *Myristicaceæ.* It is too well known to need any description. According to Bonastre, the nutmeg consists of

Fixed concrete oil	31·6
Essential oil	6·0
Gum, starch, lignin, &c.	62·4
	100·

The fixed concrete oil, the Oleum Myristicæ of Materia Medica, is imported in large rectangular cakes of an orange-yellow colour of the consistence of butter, and in scent resembling the nutmeg itself. It is soluble in boiling rectified spirit and in ether. When saponified it yields glycerin, and resembles the other vegetable fixed oils, both in this respect, and in affording fatty acids when acted upon by the alkalis.

The *Essential oil of Nutmeg* is the more active constituent of the Kernel. It is a thick colourless or straw-coloured oil, and like most others consists of a solid and liquid oil: its specific gravity is about 0·95.

Adulterations, &c.—Nutmegs have frequently been adulterated, but the sophistication is readily detected. They should be dark, plump and heavy, yielding a greasy mark when pressed by the nail or any blunt instrument.

Pharmacopœia Preparations.—Of the Kernel, Confectio Aromatica, Spiritus Armoraciæ Compositus, Spiritus Myristicæ, Tinctura Lavandulæ Composita. Of the concrete oil, Emplastrum Picis.

Medicinal Uses.—Stimulant. Dose, gr. x. to gr. xxx. grated.

SPIRITUS PIMENTÆ.

Spirit of Pimenta [*Allspice*].

Spiritus Pimento, P.L. 1788.
Spiritus Pimentæ, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Oil of Pimenta [Allspice] two fluidrachms,
Proof Spirit a gallon;
Dissolve.

Medicinal Uses and dose same as the Spirit of Peppermint.

SPIRITUS PULEGII.

Spirit of Pulegium [*Pennyroyal*].

Aqua Pulegii Spirituosa, P.L. 1746.
Spiritus Pulegii, P.L. 1788, P.L. 1809, P.L. 1824.
Spiritus Menthæ Pulegii, P.L. 1836.

Take of Oil of Pulegium [Pennyroyal] three fluidrachms,
Proof Spirit a gallon;
Dissolve.

Medicinal Uses and dose same as the Spirit of Peppermint.

SPIRITUS ROSMARINI.

Spirit of Rosemary.

Spiritus Rorismarini, P.L. 1746, P.L. 1788.
Spiritus Rosmarini, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Oil of Rosemary two fluidrachms,
Rectified Spirit a gallon;
Dissolve.

Remarks.—ROSEMARY is a well-known shrub commonly cultivated in this country, belonging to the natural family *Labiatæ.* It possesses a warm, pleasant, aromatic scent, and pungent taste. Its virtues depend on an Essential oil, which is obtained by distilling the tops of the plant whilst in bloom. The specific gravity of the oil is 0·897, its boiling-point 365°, and it consists of

Forty-five equivalents of Carbon	6×45=270	or	83·33
Thirty eight „ of Hydrogen ..	1×38= 38	„	11·72
Two „ of Oxygen	× 2= 16	„	4·95
Equivalent....	324.		100·

Formula.... $C^{45} H^{38} O^{2}$.

Adulterations, &c.—Of the Oil, see Note at the end of Section Aquæ.

Pharmacopœia Preparations of the Oil, Spiritus Rosmarini, Tinctura Lavandulæ Composita. Of Spiritus Rosmarini, Linimentum Saponis.

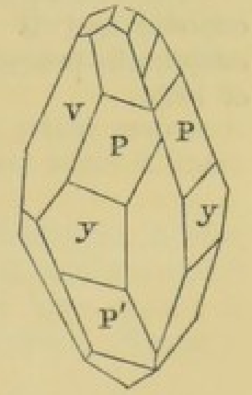
Medicinal Use.—Stimulant.

SULPHUREUM.

PREPARATION OF SULPHUR.

Sulphur is a well-known elementary or undecomposed body, which sometimes occurs in nature nearly pure, but more commonly in combination with the metals, forming sulphurets. The greater part of that which is used in the arts is the produce of volcanic countries. It exists also in combination with oxygen and metallic oxides forming sulphates, and also in bodies of organic origin, as the essential oils of black-mustard, horse-radish, &c., albumen, hair and horn. Sulphur occurs, certainly in two, probably in three allotropic conditions; the first crystallizes in rhomboidal octohedrons; in this state it occurs native, and transparent, its specific gravity being 2·066; the second form crystallizes from a fused mass in oblique rhombic prisms, which, whilst transparent, have a specific gravity of 1·982, and in the third state sulphur occurs as a brownish-black, viscid elastic substance, which has been employed for taking casts of medals, &c.; in this state its specific gravity is 1·751. By lapse of time both the two latter pass into the first state, but then become opaque. The annexed figure is a frequent form of the rhombic octohedron in which native sulphur occurs. The cleavage is parallel to the planes P. P.′

P on P...............	106° 30′
P on P over V........	85 5
P on P′..............	143 25



Sulphur, as it is usually met with, is an opaque light yellow substance with a greenish tint, of specific gravity 1·98. Its fusing-point is scarcely yet determined, various authorities placing it between 220° and 234°; at higher temperatures, about 320°, it begins to turn viscid, and assumes its maximum of viscidity at about 500°; it then becomes more liquid and boils at about 600°, when it is converted into an orange-coloured vapour, and this, when conducted into large chambers, condenses as a yellow arenaceous powder, "flowers of sulphur," which is the *Sublimed Sulphur* of Materia Medica.

Sulphur is insoluble in water, very slightly in alcohol, but more so in ether; it is readily dissolved by boiling oil of turpentine and in sulphuret of carbon. When heated in air it takes fire and burns with a peculiar blue flame, forming sulphurous acid, and from this the Acidum Sulphuricum of the Materia Medica is usually procured: see pp. 72–75. It combines with all the other elementary bodies forming acids and sulphurets, many of them of great importance in manufactures.

The equivalent number of Sulphur is 16, and its symbol or formula S. I subjoin a statement of the recognized compounds of sulphur and oxygen:—

		Eq. Nos.	*Formulæ.*
One eq. of Sulphur 16 Two „ of Oxygen 16	=Sulphurous Acid	32	SO^2.
One eq. of Sulphur 16 Three „ of Oxygen 24	=Sulphuric Acid	40	SO^3.
Two eq. of Sulphur 32 Two „ of Oxygen 16	=Hyposulphurous Acid	48	S^2O^2.
Two eq. of Sulphur 32 Five „ of Oxygen 40	=Hyposulphuric Acid ..	72	S^2O^5.

Impurities, Adulterations, and Tests.—Sublimed Sulphur is seldom adulterated. It usually contains traces of sulphuric acid, from which it may be freed by careful washing. For tests, see MATERIA MEDICA: *Sulphur.*

Pharmacopœia Preparations.—Emplastrum Ammoniaci cum Hydrargyro, Emplastrum Hydrargyri, Hydrargyri Bisulphuretum, Sulphuris Iodidum, Unguentum Sulphuris, Unguentum Sulphuris Compositum.

Medicinal Uses.—Purgative, in doses of ʒiij. to ʒiv.

SULPHUR PRÆCIPITATUM is again inserted in the Pharmacopœia, and is now placed in Materia Medica. I therefore subjoin the process for preparing it directed in the Pharmacopœia of 1824.

SULPHUR PRÆCIPITATUM, P.L. 1824.

Precipitated Sulphur.

Lac Sulphuris, P.L. 1721.
Sulphur Præcipitatum, P.L. 1746, P.L. 1788, P.L. 1809.

Take of Sublimed Sulphur a pound,
Fresh Lime two pounds,
Water four gallons ;

Boil the Sulphur and the Lime [previously slaked] together in the water ; then strain the liquor through paper, and drop into it of Muriatic (Hydrochloric) Acid as much as may be sufficient, that the Sulphur may be thrown down. Lastly, water being frequently poured upon this, wash until it becomes tasteless.

Remarks.—On referring to Potassii Sulphuretum, p. 347, it will be seen, when sulphur is fused with potash or its carbonate, that a persulphuret of the metal and a hyposulphite of the oxide are formed. Similar reactions take place when sulphur, lime, and water are boiled together, but their precise nature is yet undetermined. When hydrochloric acid is added to such a solution, both the sulphuret and hyposulphite are decomposed, chloride of calcium being formed, hydrosulphuric acid gas liberated, and sulphur precipitated in a white pulverulent state, which when washed and dried is the Sulphur Præcipitatum of Materia Medica. There is much more lime employed in the above process than is requisite; probably one-fourth of the quantity would answer better.

Properties.—This is a whitish smooth powder, which possesses no crystalline structure, and usually retains traces both of water and of hydrosulphuric acid.

Impurities, Adulterations, and Tests.—Dilute Sulphuric Acid is often employed in the preparation of precipitated sulphur, and it then is largely contaminated with sulphate of lime, which is easily detected by the tests directed in MATERIA MEDICA, *Sulphur Præcipitatum.*

Medicinal Uses.—The same as sulphur, to which, when properly made, it is to be preferred. Dose ʒj. to ʒij.

SULPHURIS IODIDUM.

Iodide of Sulphur.

Take of Sulphur an ounce,
Iodine four ounces;

Put the Sulphur into a glass vessel, and place the Iodine upon it. Hold the vessel plunged in boiling water, until they have combined. Then, when the Iodide has cooled, the vessel being broken, break it into small pieces, and keep them in another well-closed vessel.

100 grains of this being thoroughly boiled in water, there remain about 20 grains of Sulphur.

Remarks.—This is an instance of direct combination occurring between two elementary bodies, and effected by heat alone without the presence of any intermediate agent.

Properties.—Iodide of sulphur is a brilliant black grey substance, greatly resembling tersulphuret of antimony in appearance; according to H. Rose, neutral iodide of sulphur sublimes when heated out of contact with atmospheric air. It is decomposed by exposure to air or by the action of boiling water. It is doubtful whether this compound is a definite combination or only a mixture of iodine and sulphur; from the proportions of the two elements used in its formation, the iodide of sulphur of the Pharmacopœia appears to be a diniodide of sulphur, and consists of

Two equivalents of Sulphur	$16 \times 2 =$	32	or 20·26
One „ of Iodine		126	„ 79·74
Equivalent....		158.	100.

Formula.... S^2I.

Impurities, Adulterations, and Tests.—This preparation may be rendered impure from the impurities contained in its constituents, which are described under their respective heads. It may be adulterated by the use of more sulphur than is directed in the process above given. The test give in the text will readily detect this sophistication.

Incompatibles.—All substances which are decomposed by either of its constituent elements.

Pharmacopœia Preparation.—Unguentum Sulphuris Iodidi.

This preparation is not exhibited internally.

SYRUPI.

SYRUPS.

Syrups are to be kept in well-closed vessels and in a place where the heat never exceeds 55°.

Remarks.—Syrups are strong solutions of sugar in water, generally coloured or flavoured with vegetable matter; and sometimes, but more rarely, they are active medicines; it is particularly requisite that they should be kept in a cool place, or otherwise acetic acid will be generated by fermentation, and this may interfere with medicines, the virtues of which they are employed to increase, or whose disagreeable flavour they are intended to disguise.

Sugar has already been incidentally alluded to when treating of alcohol; the variety employed in the preparation of syrups is that which is exclusively used in this country for domestic purposes, being the purified crystalline principle obtained from the *Saccharum officinarum*, the Sugar-Cane, a plant belonging to the natural family *Graminaceæ*, which is extensively cultivated in many tropical countries, especially in the East and West Indies.

Properties.—When pure, cane-sugar, as this variety is termed to distinguish it from others presently to be noticed, crystallizes in large, hard, transparent, colourless, oblique rhombic crystals from a strong syrup, kept at rest in a warm place, forming the *white sugar-candy* of commerce. Its specific gravity is 1·6. It melts at 350° into a transparent, straw-coloured liquid, which when cooled (barley-sugar) retains both its colour and transparency, but solidifies into a brittle mass; thus cane-sugar exists in, at least, two allotropic states: there is probably a third, as syrups may be obtained which are incapable of yielding a crystallizable sugar. If sugar fused at 350° be more strongly heated, it begins slowly and gradually to decompose, water is given off, and a dark reddish-brown, uncrystallizable substance, termed *caramel*, is formed, extensively used as a colorant for wines, spirits, &c., and in cookery; the heat being still further increased it is completely decomposed, water and several organic products being evolved, and a carbonaceous residuum left. Cane-sugar is very soluble in cold water; hot water takes up an almost unlimited quantity of it; in alcohol, however, it is far less soluble. When pieces of cane-sugar are rubbed together in the dark, they emit considerable phosphorescence. By the action of nitric acid on sugar, oxalic acid is obtained; but if the nitric acid be much diluted the oxidation is not so complete, and saccharic acid, which forms numerous crystalline salts with bases, is formed. Sulphuric and hydrochloric acids concentrated and dilute, and lime, when respectively heated with cane-sugar, give rise to various compounds, which, excepting the product of the action of the dilute acids, grape-sugar, are quite unimportant in a pharmaceutical view. Sugar combines and forms crystalline compounds with some salts and bases, apparently analogous in some respects to the hydrates and alcoates. Cane-sugar is the sweetest variety of sugar, but it varies greatly in its sweetening powers. West Indian sugar is the sweetest variety of cane-sugar.

TREACLE, the Saccharum Fæx of the Pharmacopœia, is a viscid, reddish-brown liquid, which drains from "raw" sugar; it consists of crystallizable amorphous sugar, probably together with some sugar partially carbonized, and modified by heat; water, salts, gum, and the other vegetable products contained in cane-juice. It is gently laxative; its chief use in pharmacy is, however, for making pill masses, for which purpose it is admirably fitted, as it does not dry and harden by exposure to air.

Grape-sugar or *Glucose* occurs far more widely distributed in nature than cane-sugar; its presence in honey has already been noticed. It exists in most fruits and edible vegetables; is formed by the germination of grain, &c., the first step in the malting process; by the action of *diastase*, the saccharifying principle of malt, or starch; by that of dilute sulphuric acid, &c. on gum, lignin, cane, and other sugars, starch, &c.; as well as produced by disease and disturbance of the animal functions, *diabetic sugar*. The properties of grape-sugar differ somewhat from those of cane-sugar, but it is unnecessary to notice these differences in this work. Other varieties of sugar have been described, but these are quite unimportant, excepting the *sugar of milk* which is obtained from whey, and has a very weak, mawkish, sweet taste.

Grape-sugar must be regarded as the type of the sugars, as they are convertible into this variety, and are all probably so converted before they can undergo fermentation. I subjoin the composition of cane- and grape-sugars.

Crystallized cane-sugar consists of

Twelve equivalents of Carbon ……	$6\times12=72$	or 42·11
Eleven „ of Hydrogen ….	$1\times11=11$	„ 6·43
Eleven „ of Oxygen ……	$8\times11=88$	„ 51·46
Equivalent……	171	100·

Formula…… $C^{12}H^{9}O^{9}, 2HO$.

Crystallized Grape-sugar consists of

Twelve equivalents of Carbon......	$6\times12=$	72	or 36·36
Fourteen " of Hydrogen....	$1\times14=$	14	" 7·11
Fourteen " of Oxygen	$8\times14=$	112	" 56·53
Equivalent......		198	100·

Formula.—$C^{12}H^{12}O^{12}, 2HO$.

So that by absorbing the elements of three eqs. of water, $3H\ 3O$, cane-sugar is transformed into grape-sugar. I have formerly showed in different parts of this work how starch is converted into grape-sugar, grape-sugar into alcohol, and alcohol into acetic acid; these changes are, however, both so instructive and interesting, that I shall now subjoin a statement of the transformation an equivalent of cane-sugar may undergo in passing from anhydrous cane-sugar into dilute acetic acid. I have here shown the changes which would occur, were it to pass through the intermediate stages of starch, gum, &c., to illustrate the mode in which these, and the like substances, are transformed into grape-sugar, and ultimately into acetic acid; but in each individual instance, one or more of these stages are passed over at once by these substances, and, as in the case of the conversion of cane-sugar into grape-sugar, this seems to be at once effected, and as it were *per saltum*, without its passing through the successive steps of dextrin and gum.

			Formulæ.
One	equiv.	of Anhydrous Cane-sugar......	$C^{12}H^{9}O^{9}+$
One	"	of Water.....................	$H\ O=$
One	"	of Starch or of Dextrin	$C^{12}H^{10}O^{10}+$
One	"	of Water	$H\ O=$
One	"	of Gum or of Cryst. Cane-sugar	$C^{12}H^{11}O^{11}+$
One	"	of Water....................	$H\ O=$
One	"	of Anhydrous Grape-sugar	$C^{12}H^{12}O^{12}-$
Four	"	of Carbonic Acid	$C^{4}\ O^{8}=$
Two	"	of Alcohol	$C^{8}H^{12}O^{4}+$
Four	"	of Atmospheric Oxygen	$O^{4}=$
Two	"	of Aldehyd + four eqs. of Water	$C^{8}H^{12}O^{8}+$
Four	"	of Atmospheric Oxygen	$O^{4}=$
Two	"	of Acetic Acid + six eqs. of Water	$C^{8}H^{12}O^{12}$.

Impurities, Adulterations, and Tests.—Loaf-sugar is not liable to adulteration, but *raw*, or *brown-sugar* and treacle are extensively adulterated. Raw sugar should have a clean, bright, uniform, and sparkling, somewhat damp appearance; these, with taste and smell, are the best indications of purity, or the contrary. Various insoluble substances, as starch, &c., have been named as adulterants; their insolubility would at once detect the fraud; starch-sugar has, however, been extensively employed for this purpose. Starch-sugar may be detected in cane-sugar, provided the suspected specimen be not discoloured by the presence of much treacle, by adding sufficient sulphate of copper to a solution of the sugar to tinge it blue, and then caustic potash in considerable excess, which first precipitates and then redissolves the oxide of copper; then the liquid is to be rapidly boiled, when, if no starch-sugar (grape-sugar) be present, but slight alteration occurs in the solution; but if this exist in the suspected sugar, the red insoluble dinoxide of copper precipitates in quantity proportionate to the grape-sugar present. This test is, however, not free from objection. The quality of treacle must be ascertained from its appearance, taste and smell; an impure substance itself, adulteration, unless of a gross kind, cannot be detected by chemical tests.

Pharmacopœia Preparations.—Of Sugar, most Confections, Infusum Rosæ Compositum, Syrupus Ferri Iodidi, Ferri Carbonas cum Saccharo, some Mixtures, Pulvis Tragacanthæ Compositus, and Syrups. Of Treacle, Syrupus Sennæ and many pill masses.

Medicinal Uses.—Nutritive, demulcent, and slightly laxative.

SYRUPUS.

Syrup.

Syrupus Simplex, P.L. 1746.
Syrupus, P.L. 1809.
Syrupus Simplex, P.L. 1809, edit. alt., P.L. 1824.
Syrupus, P.L. 1836.

Take of Sugar three pounds,
Distilled Water a pint;
Dissolve with a gentle heat.

Remarks.—The quantity of sugar is reduced by one-tenth in the present preparation.

Pharmacopœia Preparation.—Confectio Opii.

SYRUPUS ALTHÆÆ.

Syrup of Althæa [*the Marshmallow*].

Syrupus de Althæâ, P.L. 1721.
Syrupus ex Althæâ, P.L. 1746.
Syrupus Althææ, P.L. 1788, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Althæa [the Marshmallow Root], sliced, an ounce and a half,
Sugar three pounds, or as much as may be sufficient,
Distilled Water a pint;
Rectified Spirit two and a half fluidounces, or as much as may be sufficient;

Macerate the Althæa in the Water for twelve hours. Press out the liquor and strain through linen. Then to the strained liquor add twice its weight of Sugar, and dissolve with a gentle heat. Lastly, when the Syrup has cooled, mix with each fluidounce of it half a fluidrachm of Spirit.

Remarks.—ALTHÆA, or Marshmallow, is an indigenous plant belonging to the natural family *Malvaceæ*; its root contains starch, gummy mucilaginous matter, sugar, &c., and a substance analogous to asparagin, termed *Althein*.

Adulterations, &c.—Syrup is sometimes sold for Syr. Althææ; the latter is rendered yellow by an alkali, the former not.

Medicinal Uses.—The proportion of sugar is greatly increased in this preparation. This syrup contains the mucilaginous matter of the marshmallow, and is used as a demulcent. It was apt to spoil by fermentation; it does not possess any active property.

SYRUPUS AURANTII.

Syrup of Orange [Peel].

Syrupus de Cortice Aurantiorum, P.L. 1721.
Syrupus e Corticibus Aurantiorum, P.L. 1746.
Syrupus Corticis Aurantii, P.L. 1788.
Syrupus Aurantii, P.L. 1809.
Syrupus Aurantiorum, P.L. 1809, edit. alt., P.L. 1824.
Syrupus Aurantii, P.L. 1836.

Take of Orange Peel, dried, two ounces and a half,
Distilled Water, boiling, a pint,
Sugar three pounds, or as much as may be sufficient,
Rectified Spirit two fluidounces and a half, or as much as may be sufficient;

Macerate the Peel in the Water for twelve hours, in a covered vessel. Press out the liquor and boil for ten minutes, then strain, and finish off in the same manner as directed for SYRUP OF ALTHÆA.

Remarks.—This syrup is employed merely on account of its grateful aromatic flavour. Dried is now substituted for fresh peel.

SYRUPUS COCCI.

Syrup of Cochineal.

Take of Cochineal, bruised, four scruples,
Distilled Water, boiling, a pint,
Sugar three pounds, or as much as may be sufficient,
Rectified Spirit two fluidounces and a half, or as much as may be sufficient;

Boil the Cochineal in the Water for a quarter of an hour in a covered vessel, frequently stirring, then strain and finish off as is directed for Syrup of Althæa.

Remarks.—This is a new preparation of the present Pharmacopœia, designed as a colorant, for which its beautiful colour especially fits it. The Cochineal insect is a native of Mexico, and is classed under the order *Hemiptera*. It is met with in commerce in small, ovate, black, or silvery-grey grains, which on close examination are readily recognised as dried insects. It is used in dyeing scarlet, which colour is produced by the action of oxide of tin on its colouring principle. *Carmine* is obtained from cochineal by a process requiring much delicacy of manipulation. Cochineal does not appear to be possessed of any medicinal properties.

Pharmacopœia Preparations.—Syrupus Cocci, Tinctura Cardamomi Composita, Tinctura Cinchonæ Composita.

SYRUPUS CROCI.

Syrup of Saffron.

Syrupus Croci, P.L. 1721, P.L. 1746, P.L. 1788,
P.L. 1809, P.L. 1824, P.L. 1836.

Take of Saffron five drachms,
Distilled Water, boiling, a pint,
Sugar three pounds, or as much as may be sufficient,
Rectified Spirit two fluidounces and a half, or as much as may be sufficient;

Macerate the Saffron in the Water for twelve hours, in a covered vessel, then strain the liquor, and finish off as is directed for Syrup of Althæa.

Remarks.—This syrup is used merely on account of its fine colour. The quantity of saffron is reduced by one-half.

Saffron is the dried stigmata of a plant belonging to the natural family *Iridaceæ* which is sometimes cultivated in this country. Good saffron is met with as a dark orange-coloured mass of filaments, possessing a peculiar and strong aromatic smell and taste. It is usually imported. Its medicinal properties, if any, may depend upon a small quantity of essential oil or the yellow and red colouring matters, which it contains together with other ordinary constituents of vegetables.

Adulterations, &c.—It is frequently adulterated with safflower and marigold petals, &c., which may be detected by steeping in water and examining the stigmata.

Pharmacopœia Preparations.—Confectio Aromatica, Decoctum Aloës Compositum, Pilula Aloës cum Myrrhâ, Syrupus Croci, Tinctura Aloës Composita, Tinctura Cinchonæ Composita, Tinctura Rhei Composita.

Medicinal Use.—Slightly stimulant.

SYRUPUS LIMONUM.

Syrup of Lemons.

Syrupus e Succo Citriorum, P.L. 1721.
Syrupus e Succo Limonum, P.L. 1746.
Syrupus Succi Limonis, P.L. 1788.
Syrupus Limonis Succi, P.L. 1788, edit. alt.
Syrupus Limonis, P.L. 1809.
Syrupus Limonum, P.L. 1809, edit. alt., P.L. 1824, P.L. 1836.

Take of the Juice of Lemons, strained, a pint,
Sugar two pounds and a half,
Rectified Spirit two fluidounces and a half;

Boil the Juice for ten minutes and strain. Add the Sugar to this and dissolve it. Lastly, when the Syrup has cooled, mix in the Spirit.

Remarks.—This is a pleasant syrup; but it must be remembered that the Citric Acid it contains prevents its being employed in any medicine that contains an alkali, alkaline earths, or their carbonates.

SYRUPUS MORI.

Syrup of the Mulberry.

Syrupus Mororum, P.L. 1746.
Syrupus Mori, P.L. 1788, P.L. 1809, P.L. 1824, P.L. 1836.

Take of the Juice of the Mulberry, strained, a pint,
Sugar two pounds and a half,
Rectified Spirit two fluidounces and a half;

Dissolve the Sugar in the Juice with a gentle heat, and set aside for twenty-four hours; then take off the scum, and pour off the clear liquor from the dregs, if there be any. Then mix in the Spirit.

Remarks.—This is used for the same purposes as the former; it has the advantage of a fine colour and is less acid.

The MULBERRY is the fruit of a tree extensively grown in this country belonging to the natural family *Urticaceæ*. It is a very pleasant wholesome fruit, the juice of which contains sugar, vegetable acids, colouring matter, &c.

SYRUPUS PAPAVERIS.

Syrup of Poppy.

Syrupus de Meconio sive *Diacodium*, P.L. 1721.
Syrupus e Meconio sive *Diacodion*, P.L. 1746.
Syrupus Papaveris Albi, P.L. 1788.
Syrupus Papaveris, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Poppy [*Capsules*], bruised and deprived of seeds, three pounds,
Sugar five pounds,
Distilled Water, boiling, five gallons,
Rectified Spirit five fluidounces;

Boil down the Water with the Capsules to two gallons, and press out strongly. Again boil down the strained liquor to four pints, and strain while hot. Set it aside for twelve hours, that the dregs may subside; then boil down the clear liquor to two pints, and dissolve the Sugar in it. Lastly, mix in the Spirit.

Medicinal Use.—Anodyne. Narcotic. Dose, fʒj. to f℥j. This syrup is very apt to ferment, and hence the necessity of keeping it cool. It is principally used for children.

SYRUPUS RHAMNI.

Syrup of Buckthorn.

Syrupus de Spinâ Cervinâ, P.L. 1721.
Syrupus e Spinâ Cervinâ, P.L. 1746.
Syrupus Spinæ Cervinæ, P.L. 1788.
Syrupus Rhamni, P.L. 1809, P.L. 1824, P.L. 1836.

Take of the Juice of Buckthorn, four pints,
Ginger, sliced,
Pimenta, powdered, each six drachms,
Sugar six pounds,
Rectified Spirit six fluidounces;

Set aside the Juice for three days, that the dregs may subside, and strain. To a pint of the strained Juice add the Ginger and Pimenta; then macerate with a gentle heat for four hours, and strain; boil down that which is left to the measure of a pint and a half; mix the liquors, and dissolve the Sugar in them. Lastly, mix in the Spirit.

Remarks.—The BUCKTHORN is an indigenous shrub belonging to the natural family *Rhamnaceæ*, the berries of which yield a juice from which *sap-green* is made. The quantity of sugar is now increased one-third in this preparation.

Medicinal Use.—Cathartic. Dose, f℥ss. to f℥j. It is an unpleasant remedy both to the taste and in its operation.

SYRUPUS RHŒADOS.

Syrup of the Red Poppy.

Syrupus de Papavere Erratico, P.L. 1721.
Syrupus Papaveris Erratici, P.L. 1746, P.L. 1788.
Syrupus Rhœados, P.L. 1809, P.L. 1824, P.L. 1836.

Take of the Red Poppy [*Petals*] a pound,
Distilled Water, boiling, a pint,
Sugar three pounds, or as much as may be sufficient,
Rectified Spirit two fluidounces and a half, or as much as may be sufficient;

Add the [Petals of the] Red Poppy gradually to the Water, heated in a water-bath, frequently stirring; then, the vessel being set aside, macerate for twelve hours; afterwards press out the liquor with the hand, and strain and finish off as is directed for SYRUP OF ALTHÆA.

Remarks.—The RED POPPY is indigenous, and belongs to the natural family *Papaveraceæ*; besides their red colouring matter the petals contain some astringent matter, and a soft resin, with several substances common to many vegetables. This syrup is of a fine red colour, and is used only on that account.

SYRUPUS ROSÆ.

Syrup of the Rose.

Syrupus e Rosis Siccis, P.L. 1721.
Syrupus Rosarum Solutivus, P.L. 1746.
Syrupus Rosæ, P.L. 1788, P.L. 1809, P.L. 1824, P.L. 1836.

Take of the Damask Rose [*Petals*], seven ounces,
Sugar six pounds,
Distilled Water, boiling, three pints,
Rectified Spirit five fluidounces and a half;

Macerate the Rose [Petals] in the Water for twelve hours, and strain. Evaporate the strained liquor in a water-bath to two pints; and in this dissolve the Sugar. Lastly, mix in the Spirit.

Medicinal Use.—Purgative, but weakly so; it is sometimes given to infants. Dose, fʒij. to f℥j.

SYRUPUS SARSÆ.

Syrup of Sarsaparilla.

Syrupus Sarsaparillæ, P.L. 1824.
Syrupus Sarzæ, P.L. 1836.

Take of Sarsaparilla three pounds and a half,
Distilled Water, boiling, three gallons,
Sugar eighteen ounces,
Rectified Spirit two fluidounces;

Boil down the Sarsaparilla in the Water from two gallons to a gallon: pour off the liquor and strain whilst hot. Again boil down the Sarsaparilla in the rest of the water to one half, and strain. Evaporate the liquors mixed together to two pints, and dissolve the Sugar in them. Lastly, when they are cold, mix in the Spirit.

Remarks.—This appears to be considerably stronger than the Syrupus Sarzæ of the last Pharmacopœia, which was a preparation of uncertain strength.

Medicinal Use.—As DECOCTUM SARSÆ, with which it is employed as an adjunct.

SYRUPUS SENNÆ.

Syrup of Senna.

Syrupus Sennæ, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Senna three ounces and a half,
Fennel [*Seed*], bruised, ten drachms,
Manna, three ounces,
Distilled Water, boiling, a pint,
Treacle, three pounds;

Macerate the Senna and Fennel [seed] in the Water with a gentle heat for six hours. Press out the liquor strongly through linen and strain, and mix the Manna with it. Evaporate the Treacle in a water-bath, until a portion when removed from the bath almost solidifies, and whilst hot add the liquor to it, stirring constantly, until they are mixed.

Remarks.—Treacle has been substituted for sugar in this preparation, it being the more laxative. The quantity of senna is increased, but the strength of the preparation remains much the same.

Medicinal Use.—This is a purgative syrup intended for children. Dose fʒij to fʒiv.

SYRUPUS TOLUTANUS.

Syrup of Tolu.

Syrupus Balsamicus, P.L. 1721, P.L. 1746.
Syrupus Tolutanus, P.L. 1788, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Balsam of Tolu ten drachms,
Distilled Water, boiling, a pint,
Sugar two pounds and a half;

Boil the Balsam in the Water for half an hour in a covered vessel, frequently stirring, and strain the cooled liquor; then add the Sugar, and dissolve it.

Remarks.—BALSAM OF TOLU exudes from a tree belonging to the natural family *Leguminosæ*; it usually occurs as solid reddish-yellow resin, of a pleasant aromatic smell and taste. It is soluble in alcohol and ether, and partially in water. In its chemical characters it resembles the Balsam of Peru; according to Kopp it consists of a hydrocarbon *toluin*, the formula of which is $C^{10} H^{16}$, free cinnamic acid, and two resins differing in their composition and degree of solubility in alcohol. Toluin is colourless, limpid, piquant, and somewhat peppery in flavour.

Medicinal Use.—It is employed merely to give a pleasant flavour to draughts and mixtures.

SYRUPUS VIOLÆ.

Syrup of the Violet.

Syrupus Violarum, P.L. 1650, P.L. 1721, P.L. 1746.
Syrupus Violæ, P.L. 1788.

Take of the Violet nine ounces,
Distilled Water, boiling, a pint,
Sugar three pounds, or as much as may be sufficient,
Rectified Spirit two fluidounces and a half, or as much as may be sufficient;

Macerate the Violet in the Water for twelve hours, then press out and strain. Set aside that the dregs may subside, and finish off as is directed for SYRUP OF ALTHÆA.

Remarks.—*The Violet* is an indigenous plant belonging to the natural family *Violaceæ*; the flowers contain an odorous principle, and a blue colouring matter which is a very useful test for both acids and alkalis, the former reddening it, whilst the latter turn it green. This ancient pharmaceutical preparation is now restored to the Pharmacopœia.

Medicinal Uses.—Gently laxative for infants and children, in doses of ʒj. to ℥ss.

SYRUPUS ZINGIBERIS.

Syrup of Ginger.

Syrupus Zingiberis, P.L. 1746, P.L. 1788,
P.L. 1809, P.L. 1824, P.L. 1836.

Take of Ginger, sliced, two ounces and a half,
Distilled Water, boiling, a pint,
Sugar two pounds and a half, or as much as may be sufficient;
Rectified Spirit, as much as may be sufficient;

Macerate the Ginger in the Water for four hours. Then press out the liquor and strain, and finish off as is directed for SYRUP OF ALTHÆA.

Remarks.—GINGER is imported from many tropical countries, particularly from the East and West Indies. The plant is endogenous, and has given its name to the natural order *Zingiberaceæ*, to which it belongs. The cultivated variety which produces ginger is propagated by seed or cuttings, planted out in the spring; at the end of the year, or the beginning of the next, the root-stocks are taken up and dried, either by artificial heat, or by scalding, peeling, and drying them in the sun; the former produces the black, the latter mode the white ginger of commerce.

Ginger is a pleasant hot aromatic, and is extensively used as a spice. It contains a soft acrid resin, a yellow volatile oil, gum, &c.

Adulterations, &c.—It should always be obtained in the unground state, and be grated immediately before using; the inferior sorts often being used for grinding, and it being readily adulterated, and also losing some of the volatile oil, on which much of its virtue depends, if kept in the ground state.

Pharmacopœia Preparations.—Confectio Opii, Confectio Scammonii, Infusum Sennæ Compositum, Pilula Cambogiæ Composita, Pilula Scillæ Composita, Pulvis Cinnamomi Compositus, Pulvis Jalapæ Compositus, Pulvis Scammonii Compositus, Syrupus Rhamni, Syrupus Zingiberis, Tinctura Zingiberis, Tinctura Rhei Composita.

Medicinal Uses.—Of the rootstock, stimulant and carminative. The syrup is impregnated with the flavour and warmth of the ginger, and is a useful adjunct to bitter infusions and griping purgatives.

TINCTURÆ.

TINCTURES.

All Tinctures should be prepared in stopped glass vessels, and frequently shaken during maceration.

Remarks.—Tinctures are solutions of various substances, in spirit of wine of different degrees of strength. The Tinctures of the Pharmacopœia are principally prepared from vegetable matters, but in some cases from metallic salts; in other instances tinctures contain ammonia, and in one case animal matter is dissolved by spirit.

The substances which are best adapted for tinctures are those which are active in small doses; for if large ones should be required, they might be in many cases objectionable on account of the quantity of spirit necessarily exhibited with them.

Those substances the medicinal principles of which are imperfectly soluble in water, or totally insoluble in it, or which spoil unless they are preserved by spirit, are especially proper for preparing tinctures from, provided the quantity of spirit be not too great to admit of their being given in sufficiently large doses; opium, digitalis, &c. are medicines of this class.

Tinctures are frequently useful additions to infusions and decoctions, the spirit preventing the decomposition which otherwise occurs rapidly; the spirit they contain also frequently acts as a useful corrective and stimulant. Tinctures which hold resinous matter in solution, such as that of Guaiacum, suffer decomposition on the addition of water, and should be exhibited with a syrup, treacle, or an emulsive mixture, to prevent the coagulation of the resin.

TINCTURA ACONITI.

Tincture of Aconite [*Monkshood*].

Take of the Root of Aconite, coarsely powdered, fifteen
ounces,
Rectified Spirit two pints;
Macerate for seven days; then press out and strain.

Remarks.—This valuable tincture is now inserted in the Pharmacopœia. Its medicinal virtues depend upon the alkaloid *aconitina*, the properties of which have been described under Extractum Aconiti, for which see *Medicinal Uses.*

Tincture of Aconite should be most carefully administered, for not only is it highly poisonous, but the roots vary greatly, and consequently the tincture, in medicinal power. Dose, ♏ij. to ♏x.

TINCTURA ALOES.

Tincture of Aloes.

Tinctura Aloës, P.L. 1788, P.L. 1809, P.L. 1824,
P.L. 1836.

Take of Socotrine, or hepatic Aloes, coarsely powdered,
an ounce,
Extract of Liquorice three ounces,
Distilled Water a pint and a half,
Rectified Spirit half a pint;
Macerate the Aloes in the Spirit mixed with the Water for seven days; then add the Extract that it may dissolve, and strain.

Medicinal Uses.—Purgative. Stomachic. Dose, f℥ss. to f℥iss.

TINCTURA ALOES COMPOSITA.

Compound Tincture of Aloes.

Elixir Proprietatis, P.L. 1721.
Elixir Aloës, P.L. 1746.
Tinctura Aloës Composita, P.L. 1788, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Socotrine or hepatic Aloes, coarsely powdered, four ounces,
Saffron two ounces,
Tincture of Myrrh two pints;
Macerate for seven days, and strain.

Medicinal Uses.—Purgative. Stomachic. Dose, f℥j. to f℥ij.

TINCTURA AMMONIÆ COMPOSITA.

Compound Tincture of Ammonia.

Spiritus Ammoniæ Succinatus, P.L. 1788, P.L. 1809, P.L. 1824.
Tinctura Ammoniæ Composita, P.L. 1836.

Take of Mastich two drachms,
Rectified Spirit nine fluidrachms,
Oil of Lavender, fourteen minims,
Stronger Solution of Ammonia a pint;
Macerate the Mastich in the Spirit, that it may be dissolved, and pour off the clear tincture; then, the other ingredients being added, shake them all together.

Remarks.—MASTICH is a resinous substance exuded from a tree which grows in the Levant, belonging to the natural family *Anacardiaceæ*; its colour is yellowish, and its taste warm and pleasant, like its scent, which is however very slight; it occurs in irregularly round and translucent drops, or "tears." It is composed of two resins, one of which, that less soluble in spirit, contains only half the quantity of oxygen existing in the more soluble one; it also contains traces of an essential oil.

This preparation has a milky appearance, owing to the separation of the mastich from its solution in spirit by the Liquor Ammoniæ. It is commonly called *Eau de Luce.* The oil of amber formerly contained in this preparation is now omitted. Its chief use is in "smelling salts."

Incompatibles.—Acids; acidulous, metallic, and earthy salts.

Medicinal Uses.—Stimulant and antispasmodic. Dose, ♏v. to ♏x. in water.

TINCTURA ASSAFŒTIDÆ.

Tincture of Assafœtida.

Tinctura Fœtida, P.L. 1746.
Tinctura Asæ Fœtidæ, P.L. 1788.
Tinctura Assafœtidæ, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Assafœtida, broken into fragments, five ounces,
Rectified Spirit two pints;
Macerate for seven days, and strain.

Medicinal Uses.—Stimulant. Antispasmodic. Dose, fʒss. to fʒiss. This tincture is rendered turbid when mixed with water, owing to the precipitation of the resinous matter of the assafœtida.

TINCTURA AURANTII.

Tincture of Orange [Peel].

Tinctura Corticis Aurantii, P.L. 1788.
Tinctura Aurantii Corticis, P.L. 1788, edit. alt.
Tinctura Aurantii, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Orange Peel, dried, three ounces and a half,
Proof Spirit two pints;
Macerate for seven days, then press out, and strain.

Pharmacopœia Preparation.—Tinctura Quinæ Composita.

Medicinal Uses.—Tonic. Stomachic. Dose, fʒij. to fʒiij. It is a useful adjunct to bitter infusions and decoctions.

TINCTURA BELLADONNÆ.

Tincture of Belladonna [*Deadly Nightshade*].

Take of Belladonna, dried, four ounces,
Proof Spirit two pints;
Macerate for seven days, then press out and strain.

Remarks.—This is one of the new tinctures inserted in the present Pharmacopœia. It contains the alkaloid *Atropia* described in pp. 109–111.

Medicinal Uses.—This preparation is seldom used internally, its chief employment being as an anodyne addition to embrocations. It is highly poisonous. Belladonna is stated to be a valuable prophylactic of scarlatina.

TINCTURA BENZOINI COMPOSITA.

Compound Tincture of Benzoin.

Balsamum Traumaticum, P.L. 1746.
Tinctura Benzoës Composita, P.L. 1788.
Tinctura Benzöini Composita, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Benzoin, coarsely powdered, three ounces and a half,
Prepared Storax two ounces and a half,
Balsam of Tolu ten drachms,
Socotrine or hepatic Aloes, coarsely powdered, five drachms,
Rectified Spirit two pints;
Macerate for seven days, and strain.

Medicinal Uses.—Stimulant. Expectorant. Dose, fʒss. to fʒij. In chronic catarrh and confirmed asthma. It is decomposed by water, resinous matter being precipitated, and must therefore be triturated with yelk of egg, or with mucilage. It is more employed externally than internally, as a stimulant to languid ulcers; but its application to fresh wounds, for which it is mostly employed under the name of ***Friar's Balsam***, appears to be injurious, by preventing the wound from healing by the first intention.

Remarks.—Benzoin is a balsam or resinous exudation from the *Styrax Benzoin*, a tree belonging to the natural family *Ebenaceæ*, growing in Sumatra and the Indian Archipelago. It is usually met with in brownish-yellow or reddish fawn-coloured masses intermixed with pieces of wood, leaves and other impurities; that is preferred which exhibits most white, translucent, oblong, friable pieces when broken; but according to the investigations of Kopp, these white, translucent tears of benzoin contain but from 8 to 12 per cent. of benzoic acid, whilst the brown resin yields some 15 to 16 per cent.

Benzoin when powdered has a most agreeable scent, and at first a sweetish taste, afterwards stimulating; it is dissolved by alcohol, and partially so by water and by ether; it is the only substance which yields *benzoic acid* in sufficient quantity to be worth extracting, although this acid exists in many other vegetable products. Benzoin varies considerably in quality ; that analysed by Kopp yielded about 14·5 per cent. of benzoic acid, and 80 per cent. of various resins. Stolze procured nearly 20 per cent of benzoic acid, and about 80 per cent. of resin, with a trace of essential oil, both from the white and from the brown resin ; from 8 to 14 per cent. is the usual quantity of acid contained in benzoin. When heated it fuses and exhales its acid, diffusing when used in small portions a most agreeable incense-like odour. Its specific gravity is about 1·063. It does not appear that benzoin is subject to adulteration.

Pharmacopœia Preparation.—Tinctura Benzoini Composita; in the last Pharmacopœia it was used in preparing benzoic acid, which is now transferred to Materia Medica ; the former process is subjoined.

ACIDUM BENZOICUM, P.L. 1836.

Benzoic Acid.

Flores Benzöini, P.L. 1721, P.L. 1746.
Flores Benzoës, P.L. 1788.
Acidum Benzöicum, P.L. 1809, P.L. 1824.

Take of Benzoin a pound.

Put the Benzoin into a proper vessel placed in sand, and the heat being gradually raised, sublime until nothing more rises; press that which is sublimed, wrapped in bibulous paper, and separate it from the oily part ; afterwards again sublime it.

Process.—Benzoic Acid may be obtained from benzoin by several processes ; thus, when it is powdered and boiled in water with lime, the benzoate of that base is formed, which is soluble in water, and is decomposed by hydrochloric acid, which precipitates the benzoic acid; or the powdered resin may be boiled in a solution of about twice its weight of carbonate of soda, by which benzoate of soda is formed ; and this may be decomposed with dilute sulphuric acid, which combining with the soda precipitates the benzoic acid, on account of its sparing solubility in water. The simplest process is however that by sublimation, as here directed ; the benzoic acid is volatilized at a moderate heat, and condenses in the upper and cool part of the apparatus. The oily matter from which the acid is directed to be separated by absorption and pressure, is probably formed by the decomposition of the resin of the benzoin, and a fresh arrangement and combination of its elements. The acid exists in the resin in an uncombined state.

Properties.—This acid, when pure, is colourless; it crystallizes in soft, pearly and rather elastic crystals, which have scarcely any smell, this is however stronger when the acid is prepared by sublimation than by precipitation; its taste is rather aromatic and penetrating than sour; by exposure to the air it suffers no change; it requires two hundred times its weight of cold or twenty-four of boiling water for solution; on cooling a crystalline mass is obtained which has the appearance of fat; alcohol takes it up readily and in large quantity, and by spontaneous evaporation prismatic crystals of the acid are formed. It is also soluble in oil of turpentine. Although the aqueous solution acts but feebly upon litmus paper, the acid nevertheless combines readily with alkalis and metallic oxides, forming salts called *benzoates*, which are but little employed in scientific, or in medical chemistry.

Benzoic acid fuses at 248° and sublimes at about 292°; if strongly heated it burns with a bright yellow flame; it dissolves in sulphuric or nitric acid without suffering decomposition.

Composition.—*Benzoyl*, the supposed base of benzoic acid, is a hydrocarbon which has not been isolated, but which is represented by the formula $C^{14} H^{5}$; combined with two equivalents of oxygen it forms *oxide of benzoyl*, and with three equivalents of oxygen, anhydrous benzoic acid, which only exists in combination with water, or with a metallic oxide, *ex. gr.* oxide of silver with which it constitutes anhydrous benzoate of silver. Anhydrous Benzoic Acid consists of

Fourteen equivalents of Carbon	6 × 14 = 84 or	68·85
Five „ of Hydrogen ..	1 × 5 = 5 „	4·10
Three „ of Oxygen	8 × 3 = 24 „	19·67
Equivalent	113.	
The crystals contain One equivalent of Water	9 „	7·38
Equivalent	122.	100·

Formulæ.—Anhydrous Benzoic Acid .. $C^{14} H^{5} O^{3}$.
Crystallized Benzoic Acid .. $C^{14} H^{5} O^{3}, HO$.

Benzoyl, and the compounds it forms with many other elementary and compound bodies, have been subjected to most elaborate investigations, but as these are only interesting in a chemical point of view, I refer for a further account of them to chemical authors, and especially to Brande's Manual, as I have adopted this author's proposal to consider the benzoyl of Liebig and Wöhler $C^{14} H^5 O^2$ as an oxide of the hydrocarbon $C^{14} H^5$.

Impurities and Tests.—See MATERIA MEDICA: *Acidum Benzoicum.* It is seldom adulterated.

Incompatibles.—Such substances as neutralize or combine with acids in general, as alkalis, their carbonates, metallic oxides, &c.

Pharmacopœia Preparation.—Tinctura Camphoræ Composita.

Medicinal Uses.—It is supposed to be stimulant and expectorant, but is rarely used excepting in Tinctura Camphoræ Composita.

TINCTURA CALUMBÆ.

Tincture of Calumba.

Tinctura Colombæ, P.L. 1788.
Tinctura Calumbæ, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Calumba, thinly sliced, three ounces,
Proof Spirit two pints;
Macerate for seven days, then press out and strain.

Medicinal Uses.—Tonic. Stomachic. Dose, fʒj. to fʒiij.

TINCTURA CAMPHORÆ COMPOSITA.

Compound Tincture of Camphor.

Elixir Paregoricum, P.L. 1746.
Tinctura Opii Camphorata, P.L. 1788.
Tinctura Camphoræ Composita, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Camphor two scruples and a half,
Opium, powdered,
Benzoic Acid, each seventy-two grains,
Oil of Anise a fluidrachm,
Proof Spirit two pints;
Macerate for seven days, and strain.

Medicinal Use.—Anodyne. Dose, fʒj. to fʒiij. A fluidounce contains nearly two grains of opium.

TINCTURA CANTHARIDIS.

Tincture of Cantharides.

Tinctura Cantharidum, P.L. 1721, P.L. 1746.
Tinctura Cantharidis, P.L. 1788.
Tinctura Lyttæ, P.L. 1809.
Tinctura Cantharidis, P.L. 1824, P.L. 1836.

Take of Cantharides, bruised, four drachms,
Proof Spirit two pints;
Macerate for seven days, then press out and strain.

Medicinal Uses.—Diuretic. Stimulant. Dose, ♏x. to fʒj. given in some demulcent infusion. It is useful in gleets, fluor albus, and incontinence of urine. It is likewise employed externally as a stimulating embrocation or rubefacient, in conjunction with Camphor Liniment, &c.

TINCTURA CAPSICI.

Tincture of Capsicum.

Tinctura Capsici, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Capsicum, bruised, ten drachms,
Proof Spirit two pints;
Macerate for seven days, then press out and strain.

Medicinal Use.—Stimulant. Dose, ♏x. to fʒj. It is employed in the low stage of typhus, and similar cases.

Remarks.—Capsicum is the fruit of a plant growing in tropical countries, belonging to the natural family *Solanaceæ*; the variety called *Chilies* is cultivated in England, but that of the Pharmacopœia, *Guinea-pepper* or *bird-pepper*, is chiefly imported in shrivelled capsules of less than an inch in length, and of a dirty yellowish or orange-red colour. When ground, the powder is *Cayenne pepper*. Capsicum contains an acrid oil or resin, an aromatic extractive, besides other substances met with in many vegetable products. The acrid oil or resin is soluble in hot water, spirit, vinegar, and the fixed oils. When purified, this acrid principle is termed *Capsicin*, and appears to possess basic properties, combining and forming crystalline salts with acetic, nitric, and sulphuric acids, which are precipitated by alkalis. It is described as being capable of crystallization, permanent in air, insoluble in cold water and ether, but slightly soluble in hot water and alcohol. The impure capsicin described by Braconnot, when volatilized, emits such pungent fumes, that half a grain so vaporized in a large room, will cause all who are present to cough and sneeze violently. It does not appear to have been analysed.

Adulterations, &c.—Capsicum is not subject to adulteration, but Cayenne pepper, which should be merely this drug ground, is most extensively adulterated, and often with most deleterious substances; bright red Cayenne pepper is invariably factitious.

TINCTURA CARDAMOMI COMPOSITA.

Compound Tincture of Cardamom.

Tinctura Stomachica, P.L. 1746.
Tinctura Cardamomi Composita, P.L. 1788,
P.L. 1809, P.L. 1824, P.L. 1836.

Take of Cardamom [*husked and*], bruised,
Caraway, bruised,
Cochineal, bruised, each two drachms and a half,
Cinnamon, bruised, five drachms,
Raisins, stoned, five ounces,
Proof Spirit two pints;
Macerate for seven days, then press out and strain.

Medicinal Uses.—Stimulant. Carminative. Dose, fʒj. to fʒij. It is generally employed as an adjunct to bitter infusions.

Remarks.—The CARDAMOM is the dried fruit of a plant belonging to the natural family *Zingiberaceæ.* There are several varieties of Cardamoms known in commerce, of which those cultivated in Malabar, especially on the Wynaad, are the best; these have a fragrant odour, and a warm, aromatic slightly pungent taste, which they yield both to water and to spirit.

Composition.—The properties of cardamom seed are derived from its volatile oil, of which it yields about 4·6 per cent.; this is colourless, of an agreeable odour and an aromatic burning taste, which are lost by keeping. Its specific gravity is 0·943. It is very soluble in alcohol, ether, acetic acid, and the volatile and fixed oils, but not in alkalis.

Cardamom seeds also yield a fixed oil, which has some analogy to castor oil; it is soluble in alcohol, ether, and oils, and is reddened when heated with nitric acid.

Pharmacopœia Preparations.—Of the Seed, Confectio Aromatica, Pilula Colocynthidis Composita, Pulvis Cinnamomi Compositus, Tinctura Cardamomi Composita, Tinctura Cinnamomi Composita, Tinctura Gentianæ Composita, Tinctura Sennæ Composita. Of the Compound Tincture, Decoctum Aloës Compositum, Mistura Gentianæ Composita.

Medicinal Uses.—Cardamom seeds are rarely exhibited alone, but as an agreeable aromatic they are employed as adjuncts or correctives of stimulants, tonics, and purgatives.

TINCTURA CASCARILLÆ.

Tincture of Cascarilla.

Tinctura Cascarillæ, P.L. 1788, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Cascarilla, bruised, five ounces,
Proof Spirit two pints;
Macerate for seven days, then press out and strain.

Medicinal Uses.—Tonic. Stomachic. Dose, fʒj. to fʒij.

TINCTURA CASTOREI.

Tincture of Castor.

Tinctura Castorei, P.L. 1721, P.L. 1746, P.L. 1788, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Castor, bruised, two ounces and a half,
Rectified Spirit two pints;
Macerate for seven days, then press out and strain.

Medicinal Uses.—Antispasmodic. Stimulant. Dose, ♏xx. to fʒij.

Remarks.—The follicles of the prepuce of the Beaver, order *Rodentia*, contain a brown, viscid, fetid secretion, which after removal from the animal dries and indurates into a compact solid called CASTOR. This has a brown colour, a strong disagreeable odour, and a bitter taste; it has been supposed to contain a small quantity of a peculiar principle called *castorin*, but the results of various analyses differ so widely, that it is difficult to suppose that the same substances have been examined.

Pharmacopœia Preparation.—Tinctura Castorei.

Medicinal Use.—Stimulant. Antispasmodic. It is but little employed.

TINCTURA CATECHU COMPOSITA.

Tincture of Catechu.

Tinctura Japonica, P.L. 1746.
Tinctura Catechu, P.L. 1788, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Catechu, powdered, three ounces and a half,
Cinnamon, bruised, two ounces and a half,
Proof Spirit two pints;
Macerate for seven days, then press out and strain.

Medicinal Use.—Astringent. Dose, fʒj. to fʒiij. It is a very useful and grateful adjunct to Mistura Cretæ in diarrhœa.

TINCTURA CINCHONÆ.

Tincture of Cinchona.

Tinctura Corticis Peruviani Simplex, P.L. 1746.
Tinctura Corticis Peruviani, P.L. 1788.
Tinctura Cinchonæ, P.L. 1788, edit. alt., P.L. 1809, P.L. 1824, P.L. 1836.

Take of Yellow Cinchona, bruised, eight ounces,
Proof Spirit two pints;
Macerate for seven days, then press out and strain.

Medicinal Uses.—Tonic. Stomachic. Dose, fʒj. to fʒiij. It is principally used in mixtures, with the Infusion or Decoction of Cinchona.

TINCTURA CINCHONÆ COMPOSITA.

Compound Tincture of Cinchona.

Tinctura Corticis Peruviani Composita, P.L. 1788.
Tinctura Cinchonæ Composita, P.L. 1788, edit. alt., P.L. 1809, P.L. 1824, P.L. 1836.

Take of Pale Cinchona, bruised, four ounces,
Orange Peel, dried, three ounces,
Serpentary, bruised, six drachms,
Saffron two drachms,
Cochineal, bruised, a drachm,
Proof Spirit two pints;
Macerate for seven days, then press out and strain.

Medicinal Uses.—Tonic. Stomachic. Dose, fʒj. to fʒiij. It contains considerably less cinchona than the simple tincture, but is rendered more grateful by the admixture of the bitters and aromatics.

TINCTURA CINCHONÆ PALLIDÆ.

Tincture of Pale Cinchona.

Prepare this by the same method which is directed for Tincture of Cinchona.

Medicinal Uses.—See Tinctura Cinchonæ.

TINCTURA CINNAMOMI.

Tincture of Cinnamon.

Tinctura Cinnamomi, P.L. 1746, P.L. 1788, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Cinnamon, bruised, three ounces and a half,
Proof Spirit two pints;
Macerate for seven days, then press out and strain.

Medicinal Uses.—See Tinctura Cinnamomi Composita.

TINCTURA CINNAMOMI COMPOSITA.

Compound Tincture of Cinnamon.

Tinctura Aromatica, P.L. 1746.
Tinctura Cinnamomi Composita, P.L. 1788, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Cinnamon, bruised, an ounce,
Cardamom [*husked and*], bruised, half an ounce,
Long Pepper, powdered,
Ginger, bruised, each two drachms and a half,
Proof Spirit two pints;
Macerate for seven days, then press out and strain.

Medicinal Uses.—This and the former are both stomachic and astringent. Dose, f℥j. to f℥ij.

TINCTURA COLCHICI.

Tincture of Colchicum [*Meadow Saffron*].

Tinctura Colchici, P.L. 1836.

Take of Colchicum Seed, bruised, five ounces,
Proof Spirit two pints;
Macerate for seven days, then press out and strain.

Medicinal Uses.—In rheumatism and gout. Dose ♏xx. to ♏xxx. See Acetum Colchici.

TINCTURA COLCHICI COMPOSITA.

Compound Tincture of Colchicum [*Meadow Saffron*].

Spiritus Colchici Ammoniatus, P.L. 1824, edit. alt.
Tinctura Colchici Composita, P.L. 1836.

Take of Colchicum Seed, bruised, five ounces,
Aromatic Spirit of Ammonia two pints;
Macerate for seven days, then press out and strain.

Medicinal Uses.—Diuretic. Dose, ♏xx. to ♏xxx. in water. The substances enumerated as incompatible with the Spiritus Ammoniæ Aromaticus, are also with this preparation.

TINCTURA CONII.

Tincture of Conium [*Hemlock*].

Tinctura Conii, P.L. 1836.

Take of Conium [*Hemlock*], dried, five ounces,
Proof Spirit two pints;
Macerate for seven days, then press out and strain.

Medicinal Uses.—Narcotic and Antispasmodic. Dose, fʒss. to fʒj.

TINCTURA CUBEBÆ.

Tincture of Cubeb.

Tinctura Cubebæ, P.L. 1836.

Take of Cubeb, powdered, a pound,
Proof Spirit two pints;
Macerate for seven days, then press out and strain.

Medicinal Uses.—Stimulant. Internally taken in cases of gonorrhœa. Dose, fʒss. to fʒij.

Remarks.—This tincture is now made with proof instead of rectified Spirit, and is more than twice as strong with respect to the drug as the tincture of the last Pharmacopœia.

Cubebs are the dried unripe berries of a plant belonging to the natural family of *Piperaceæ*; they are brown and wrinkled, and oily when crushed. The taste of Cubebs is warm and spicy, and the smell peculiar and aromatic. They contain an essential oil, a crystalline substance *Cubebin*, resin, wax, &c.

Oil of Cubebs is of a pale green colour, and specific gravity 0·929; it boils between 480° and 500°, and is isomeric with oil of turpentine, its formula being $C^{15} H^{12}$. It forms a crystalline compound with hydrochloric acid.

Cubebin is a neutral substance resembling piperin in many of its properties, but it contains no nitrogen; it crystallizes in acicular, tasteless and scentless tufts, permanent at 392° *in vacuo*; it is not volatile, and is almost insoluble in cold water and cold spirit of wine, but very soluble in boiling alcohol and in ether. MM. Soubeiran and Capitaine regard it as composed of

Seventeen equivalents	of Carbon ..	6×17=102	or	67·54
Nine ,,	of Hydrogen	1× 9= 9	,,	5·98
Five ,,	of Oxygen ..	8× 5= 40	,,	26·48
	Equivalent	151.		100·

Formula. . . . . . $C^{17} H^{9} O^{5}$.

Medicinal Uses.—Of the berries, the same as the tincture, freshly powdered, in doses of ℈j. to ʒij. three times a day.

TINCTURA DIGITALIS.

Tincture of Digitalis [*Foxglove*].

Tinctura Digitalis, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Digitalis [*Foxglove*], dried, four ounces,
Proof Spirit two pints;
Macerate for seven days, then press out and strain.

Medicinal Uses.—Diuretic. Sedative. Dose, ♏x. to ♏xl., gradually increased. If it occasion vomiting or purging, its diuretic powers will be lost, which may be prevented by the use of a small quantity of opium.

TINCTURA ERGOTÆ ÆTHEREA.

Ethereal Tincture of Ergot.

Take of Ergot, bruised, fifteen ounces,
Ether two pints;
Macerate for seven days, then press out and strain.

Remarks.—Ergot is the diseased seed of some plants, and appears to be owing to a fungus to which the *Graminaceæ* are particularly subject, more especially Rye. It occurs in curved pieces of half an inch to an inch and a half long, bluish-black or brown externally, although sometimes whitish; and yellowish internally, of an acrid taste and somewhat nauseous smell. It should be carefully dried and kept in stoppered green glass bottles.

Its active principle has been described by Bonjean under the name of *Ergotin*, which appears to be a brown amorphous substance, blood-red when in thin laminæ, very soluble in water, with which it forms a bright red solution, insoluble in ether and in alcohol; its taste is bitter and acrid, and its smell like that of roasted meat. In ergot the active principle must be combined with some substance which renders it soluble in ether. Ergotin possesses the medicinal without the poisonous properties of ergot, which latter reside in a fat oil, soluble in ether, of specific gravity 0·94, and saponified by the alkalis. Neither the Ergotin nor the oil appear to have been analysed.

Adulterations, &c.—Factitious ergot made of plaster of Paris, or flour moulded and coloured, is met with in commerce. Genuine ergot should have a smooth surface not powdery, with a clean fracture, and burn with a clear jetting flame.

Medicinal Uses.—In difficult parturition, Dose of the powder, gr. xv. to gr. xx. every half-hour until a drachm has been taken. Dose of the tincture, ♏xxx. twice or thrice repeated, with intervals of half an hour.

TINCTURA GALLÆ.

Tincture of the Gall-nut.

Tinctura Gallæ, P.L. 1836.

Take of the Gall-nut, powdered, five ounces,
Proof Spirit two pints;
Macerate for seven days, then press out and strain.

Medicinal Use.—Astringent. Dose, ♏xx. to f℥ij. It is principally employed as a chemical reagent for the detection of metals in solution, especially of iron. It contains gallic and tannic acids.

Remarks.—The GALL-NUT is an excrescence produced by a species of *Cynips* puncturing the bark of a description of oak belonging to the natural family *Cupuliferæ*; the best kinds, "blue galls," are imported principally from the Levant.

Composition.—Gall-nuts are composed of tannic acid, a trace of gallic acid, pectic acid, gallates, and tannates of lime and potash, &c. Their properties depend principally on

Tannic Acid, or *gallo-tannic acid* as it has been termed to distinguish it from other descriptions of tannic acid, see p. 229. This acid is procured by allowing ether to percolate through bruised galls placed in a spherical and stoppered glass vessel terminating in an open tube, which tube is to be slightly plugged with linen, and to accurately fit an empty receiving bottle. The ether should be *washed ether*, containing, as it usually does in commerce, about ten per cent. of water. When the ether has filtered through the galls and collected in the receiving vessel, it will consist of two liquids, the upper, ether containing a little tannic and gallic acids, whilst the lower consists of a syrupy aqueous solution of tannic acid. This aqueous solution is to be washed with two or three successive portions of ether, and then evaporated *in vacuo* over sulphuric acid, or quicklime. By these means a yellowish-white crystalline solid is obtained, which is gallo-tannic acid.

This process depends on the avidity with which the tannic acid combines with water, withdrawing it from the ether, and dissolving in it to the exclusion of the other soluble constituents of the galls.

Properties.—*Gallo-tannic Acid* is almost colourless, of a very astringent taste but no smell; very soluble in water, less so in alcohol and in ether. Its aqueous solution reddens litmus paper, effervesces with the alkaline carbonates, and forms definite salts with most metallic oxides; under some circumstances it is probably decomposed when brought into contact with a base, so that all these salts must not be regarded as pure gallo-tannates. Its characteristic test is the copious white precipitate it affords with a solution of gelatin, and it is this property of this series of acids which is rendered available in the industrial process of tanning skins, for which purpose however the cheaper sources of this acid, oak-bark, catechu, &c., are had recourse to. Tannic acid is composed of

Eighteen equivalents	of Carbon ..	$6 \times 18 = 108$	or 50·94
Eight ,,	of Hydrogen	$1 \times 8 = 8$	,, 3·77
Twelve ,,	of Oxygen. .	$8 \times 12 = 96$	,, 45·29
	Equivalent.	212.	100·

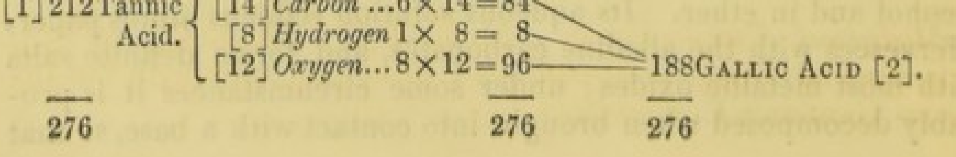
Formula. . . . . $C^{18} H^8 O^{12}$.

Liebig regards this acid as tribasic, but it would appear on insufficient grounds. When a solution of tannic acid, or the gall-nut, bruised, made into a paste with water, is exposed to the air for some months, oxygen is absorbed and *gallic acid* is formed. If gall-nuts be used, the paste should be pressed to separate the colouring matter and other impurities; the solid residue then treated with boiling water, and this solution crystallized, yields gallic acid, which when purified by re-solution in water, decolorizing by animal charcoal, and recrystallizing, yields silky, acicular, colourless crystals of gallic acid, which may be obtained, especially if not decolorized, in well-defined crystals, the primary form of which is a doubly-oblique rhombic prism; it has a bitterish, slightly acid taste, is soluble in water and in alcohol, reddens litmus, and forms numerous definite and often crystallized salts with the metallic oxides. Gallic acid does not precipitate gelatin nor the alkaloids. Gallic acid dried at 212° consists of

Seven equivalents	of Carbon	$6 \times 7 = 42$	or 49·41
Three ,,	of Hydrogen . .	$1 \times 3 = 3$	,, 3·53
Five ,,	of Oxygen	$8 \times 5 = 40$	,, 47·06
	Equivalent.	85.	100·

Formula. . . . . $C^7 H^3 O^5$.

The crystals contain an eq. of water, consequently the formula of crystallized gallic acid is $C^7 H^3 O^5, HO$, and its equivalent 94; from this, by the aid of the subjoined diagram, the changes will be seen which probably take place, for as yet the actual changes are not ascertained, when gallo-tannic acid is oxidized and converted into crystallized gallic acid.



Both Gallo-tannic and Gallic acids by the action of heat and reagents, give rise to numerous and interesting compounds, which however it is foreign to the object of this work to consider.

Properties of Tincture of Galls.—This tincture contains both gallic and gallo-tannic acids, and is a most valuable chemical test; it does not affect the salts of the alkalis nor of the earths, nor of zinc and cadmium, nor the protosalts of iron and manganese. With salts of lead and antimony it yields white, with the nitrates of mercury and silver yellow, with sulphate of titanium blood-red, and with osmic acid and the sesquisalts of iron bluish-purple or bluish-black, with gelatin and salts of the alkaloids white precipitates; the appearance of these precipitates is of course modified by the strength of the solutions of the salts and by their purity.

Adulterations and Tests.—Neither gall-nuts, nor the acids they contain, are liable to adulteration. For Tests see MATERIA MEDICA: *Galla, Acidum Gallicum, Acidum Tannicum.*

Incompatibles.—See above and DECOCTUM GALLÆ.

Pharmacopœia Preparations.—Of the Gall-nut, Decoctum Gallæ, Tinctura Gallæ, Unguentum Gallæ Compositum.

Medicinal Uses.—Astringent, as DECOCTUM GALLÆ and TINCTURA GALLÆ.

TINCTURA GENTIANÆ COMPOSITA.

Compound Tincture of Gentian.

Tinctura Amara, P.L. 1746.
Tinctura Gentianæ Composita, P.L. 1788,
P.L. 1809, P.L. 1824, P.L. 1836.

Take of Gentian, sliced, two ounces and a half,
Orange Peel, dried, ten drachms,
Cardamom [*husked and*], bruised, five drachms,
Proof Spirit two pints;
Macerate for seven days, then press out and strain.

Medicinal Uses.—Tonic. Stomachic. Dose, fʒj. to fʒij. It is most advantageously exhibited in combination with the Infusum Gentianæ Compositum.

TINCTURA GUAIACI COMPOSITA.

Compound Tincture of Guaiacum.

Tinctura Guaiacina Volatilis, P.L. 1746.
Tinctura Guaiaci, P.L. 1788.
Tinctura Guaiaci Ammoniata, P.L. 1788, edit. alt., P.L. 1809, P.L. 1824.
Tinctura Guaiaci Composita, P.L. 1836.

Take of Guaiacum [*Resin*], coarsely powdered, seven ounces,
Aromatic Spirit of Ammonia two pints;
Macerate for seven days, and strain.

Medicinal Uses.—Stimulant. Diaphoretic. Dose, fʒss. to fʒij. When mixed with water the guaiacum is precipitated; it should therefore be exhibited in mixture with some mucilage, or with yelk of egg.

It is incompatible with acids, and with acidulous, earthy, and metallic salts.

Remarks.—GUAIACUM is a resin obtained by heat from the wood, *Guaiaci Lignum*, of a tree growing in the West Indies, and belonging to the natural family *Zygophyllaceæ*.

Guaiacum wood, or *Lignum Vitæ*, is imported in logs, the outer ring of which is yellow, whilst the centre is of a dark brownish-green colour; the specific gravity of this latter is 1·333. It contains a peculiar resin, the Guaiacum of the Pharmacopœia; an acrid principle, and some other products common to vegetable substances. For medicinal use the wood is sold in raspings, which possess the peculiar taste of the resin, and an aromatic scent.

The resin of guaiacum has been frequently examined; it occurs in translucent greenish masses, which exhibit a bright surface when broken and of colours changing from red to brown and green; its specific gravity is 1·29. Guaiacum resin is insoluble in water, but readily dissolves in alcohol, and alkaline solutions; when it is exposed to air in fine powder it acquires a deep green colour. It consists, according to Unverdorben, of two resins, one of which forms a soluble salt with ammonia, and appears to possess acid properties; and a second which combines and forms a sticky tar-like compound with ammonia; whilst Jahn recognises the existence of three varieties of resin in guaiacum. According to Johnstone, the composition of guaiacum resin is represented by the formula $C^{45} H^{23} O^{11}$. The changes of colour this resin and its solutions undergo by the action of light, and of various reagents, are very remarkable.

Adulterations, &c.—Refuse benzoin from which the acid has been sublimed, common colophony, &c., have been used for this purpose; the aspect of the former betrays it, and the presence of colophony will be manifested by mixing a tincture of the suspected resin with water, and adding excess of potash to the milky liquid, when, if pure, the cloudiness will disappear, and the liquid become clear, but will remain turbid if any colophony be present.

Incompatibles.—With the tincture, water, hydrochloric acid, and all substances which precipitate the resin.

Pharmacopœia Preparations.—Of the Wood, Decoctum Sarsæ Compositum. Of the Resin, Mistura Guaiaci, Pilula Hydrargyri Chloridi Composita, Tinctura Guaiaci Composita.

TINCTURA HELLEBORI.

Tincture of Hellebore.

Tinctura Hellebori, P.L. 1721.
Tinctura Melampodii, P.L. 1746.
Tinctura Hellebori Nigri, P.L. 1788,
P.L. 1809, P.L. 1824.
Tinctura Hellebori, P.L. 1836.

Take of Hellebore, bruised, five ounces,
Proof Spirit two pints;
Macerate for seven days, then press out and strain.

Remarks.—This very ancient remedy, BLACK HELLEBORE, belongs to the natural family *Ranunculaceæ*; the cylindrical blackish fibres, about the thickness of a common knitting-needle, attached to the rootstock are the most active portions of the root. Hellebore is said to contain a volatile oil, and an acid, respecting which nothing certain appears to be known. The root is poisonous, and is spoiled by long keeping.

Medicinal Use of the Tincture.—Emmenagogue. Dose, ♏xxx. to f℥j.

TINCTURA HYOSCYAMI.

Tincture of Hyoscyamus [*Henbane*].

Tinctura Hyoscyami, P.L. 1809, P.L. 1824,
P.L. 1836.

Take of Hyoscyamus [*Henbane*], dried, five ounces,
Proof Spirit two pints;
Macerate for seven days, then press out and strain.

Medicinal Use.—Narcotic. Dose, fʒss. to fʒij. It is stated to procure sleep without affecting the head, or producing the costiveness which opium is apt to do.

TINCTURA JALAPÆ.

Tincture of Jalap.

Tinctura Jalapii, P.L. 1746, P.L. 1788.
Tinctura Jalapæ, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Jalap, coarsely powdered, five ounces,
Proof Spirit two pints;
Macerate for seven days, then press out and strain.

Medicinal Use.—Cathartic. Dose, fʒj. to f℥ss. It is an efficient medicine, but is rarely administered excepting as an adjuvant to cathartic combinations.

TINCTURA IODINII COMPOSITA.

Compound Tincture of Iodine.

Tinctura Iodinii Composita, P.L. 1836.

Take of Iodine an ounce,
Iodide of Potassium two ounces,
Rectified Spirit two pints ;
Macerate until they are dissolved, and strain.

Medicinal Uses.—As LIQUOR POTASSII IODIDI COMPOSITUS. Dose, ♏x. to f℥j.

TINCTURA KINO.

Tincture of Kino.

Tinctura Kino, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Kino, powdered, three ounces and a half,
Rectified Spirit two pints;
Macerate for seven days, and strain.

Remarks.—East Indian KINO, the kind usually met with, is an exudation from a tree belonging to the natural family *Leguminosæ*; it occurs in small shining opaque granules or tears, of a peculiar reddish-black colour, very brittle, and tinging the saliva blood-red when chewed. The taste of kino is strongly astringent, but it is devoid of smell. The medicinal properties of kino depend upon the tannic acid it contains, which, together with the red colouring matter, seem to be the sole constituents of this drug. According to Vauquelin, kino contains about 75 per cent. of tannic acid. Kino-tannic acid has not been accurately examined, but its properties resemble those assigned to catechu-tannic acid, p. 229, rather than those of gallo-tannic acid.

Adulterations and Tests.—If adulterated, the sophistication would be readily detected by comparison with the characteristics of kino above given.

Incompatibles.—As Infusum Catechu Compositum.

Pharmacopœia Preparations.—Pulvis Kino Compositus, Tinctura Kino.

Medicinal Use of the Tincture.—Astringent. Dose, fʒj. to fʒij. It is said to be less efficacious than the Tinctura Catechu.

TINCTURA LAVANDULÆ COMPOSITA.

Compound Tincture of Lavender.

Spiritus Lavendulæ Compositus Matthiæ, P.L. 1721.
Spiritus Lavendulæ Compositus, P.L. 1746.
Tinctura Lavendulæ Composita, P.L. 1788.
Spiritus Lavendulæ Compositus, P.L. 1788, edit. alt.
Spiritus Lavandulæ Compositus, P.L. 1809, P.L. 1824.
Tinctura Lavandulæ Composita, P.L. 1836.

Take of Oil of Lavender a fluidrachm and a half,
Oil of Rosemary ten minims,
Cinnamon, bruised,
Nutmeg, bruised, each two drachms and a half,
Red Saunders Wood, sliced, five drachms,
Rectified Spirit two pints;

Macerate the Cinnamon, Nutmeg, and Red Saunders Wood, in the Spirit for seven days; then press out and strain, and dissolve the Oils in the strained tincture.

Medicinal Uses.—Stimulant. Stomachic, in languors, &c. Dose, from fʒss. to fʒij. in water or any convenient liquid.

Remarks.—OIL OF LAVENDER is obtained by distilling the flowering spikes of a shrub belonging to the natural family *Labiatæ*, which is extensively grown for this purpose both in this country and abroad. The English oil is far superior to foreign oil of lavender, and on this account this description is directed to be used by the College.

Essential oil of Lavender is of a pale yellow colour, warm aromatic taste, and very agreeable odour, especially if long kept and diffused in spirit. The quantity of oil yielded by the flowers varies greatly, according to the favourableness or the contrary of the season. Its specific gravity ranges from 0·870 to 0·897; it boils at about 397°; it dissolves in every proportion in alcohol of sp. gr. 0·83, and consists, like most other essential oils, of an oil and a camphor which probably differ in composition, as the analyses of various specimens of this oil by Kane show a variable composition of the oils examined; he regards oil of lavender as represented by the formula $C^{15} H^{14} O^{2}$, but, for the reason above assigned, this cannot be relied on, and consequently I have not appended its composition in the usual tabular form.

Adulterations, &c.—Oil of Lavender is frequently adulterated. See note at the end of Section AQUÆ.

Pharmacopœia Preparations.—Of Oil of Lavender, Linimentum Camphoræ Compositum, Tinctura Ammoniæ Composita, Tinctura Lavandulæ Composita. Of the Tincture, Liquor Potassæ Arsenitis.

RED SAUNDERS WOOD is obtained from a tree belonging to the natural family *Leguminosæ*. It contains a colourless crystalline principle which it yields to ether termed *santalin*, which is soluble in water, alcohol and ether, is reddened by exposure to air, by the action of alkalis, and of most dilute acids, resembling in these qualities many other deoxidized bases of colouring substances. Its only Pharmacopœial use is as a colouring material.

TINCTURA LIMONUM.

Tincture of Lemons.

Take of Lemon Peel, fresh, three ounces and a half,
Proof Spirit two pints;
Macerate for seven days, then press out and strain.

Remarks.—This is a new tincture; it is merely employed for its pleasant flavour.

TINCTURA LOBELIÆ.

Tincture of Lobelia [*Indian Tobacco*].

Take of Lobelia, powdered, five ounces,
Proof Spirit two pints;
Macerate for seven days, then press out and strain.

TINCTURA LOBELIÆ ÆTHEREA.

Ethereal Tincture of Lobelia [*Indian Tobacco*].

Take of Lobelia, powdered, five ounces,
Ether fourteen fluidounces,
Rectified Spirit twenty-six fluidounces;
Macerate for seven days, then press out and strain.

Remarks.—This and the preceding tincture are now for the first time inserted in the Pharmacopœia.

LOBELIA, or Indian Tobacco, is a herb growing in the United States, belonging to the natural family *Lobeliaceæ*, and is imported in dried rectangular cakes of a slight but unpleasant odour, and when chewed of an acrid nauseous taste, somewhat resembling tobacco. It appears to contain an essential oil, fat, resins, and wax, with a peculiar alkaloid *Lobelina*, &c. A circuitous process has been lately described for procuring Lobelina in a pure state, when it occurs as a volatile, oily, viscid, and transparent liquid, possessing a decidedly alkaline reaction; it does not itself crystallize but forms crystalline salts with some of the acids, is decomposed by the alkalis, and is soluble in water, alcohol, and ether. Its solutions are precipitated by tincture of galls.

Medicinal Uses.—These tinctures are used as sedative expectorants in bronchitis, hooping-cough and asthma. The ethereal tincture is usually preferred; of either of them the dose is from ♏x. to ♏xxx.; they should be used with caution.

TINCTURA LUPULI.

Tincture of the Hop.

Tinctura Humuli, P.L. 1809, P.L. 1824.
Tinctura Lupuli, P.L. 1836.

Take of the Hop six ounces,
Proof Spirit two pints;
Macerate for seven days, then press out and strain.

Medicinal Uses.—Sedative. Tonic. Dose, from fʒss. to fʒij. Its powers are questionable as a narcotic, but are stomachic.

TINCTURA MYRRHÆ.

Tincture of Myrrh.

Tinctura Myrrhæ Simplex, P.L. 1721.
Tinctura Myrrhæ, P.L. 1746, P.L. 1788,
P.L. 1809, P.L. 1824, P.L. 1836.

Take of Myrrh, powdered, three ounces,
Rectified Spirit two pints;
Macerate for seven days, then press out and strain.

Remarks.—MYRRH is a resin which exudes from a shrub belonging to the natural family *Amyridaceæ*; it is imported from Arabia and Abyssinia *viâ* the East Indies; it occurs in various-sized, translucent, yellowish or reddish-coloured tears and lumps, of a characteristic taste and smell. Myrrh consists chiefly of a resin and gum (Arabin), it also yields an essential oil by distillation; its specific gravity varies from 1·120 to 1·180.

Essential oil of Myrrh is lighter than water, viscid, and yellowish, soluble in alcohol and in ether, and rapidly thickens and embrowns by exposure to air, which, with the assistance of moisture, gradually converts it into formic acid and resin.

The resin of Myrrh is soluble in alcohol and ether, but almost insoluble in solution of potash: it yields a reddish-violet colour when acted on by nitric or acetic acids. A second resin has been described, but there is no reason for regarding it as really distinct from that just mentioned; from the analyses of the oil and resin, the latter would appear to be the result of the oxidation of the former.

Adulterations and Tests.—Myrrh is frequently mixed with inferior descriptions of this drug, and also adulterated with other resins. The following test has been given to determine its purity. Mix equal weights of powdered myrrh and hydrochlorate of ammonia, and a quarter of an hour afterwards add fifteen to twenty times its weight of water. Complete solution should be promptly effected if the myrrh be pure.

Pharmacopœia Preparations.—Decoctum Aloes Compositum, Mistura Ferri Composita, Pilula Aloes cum Myrrhæ, Pilula Galbani Composita, Pilula Rhei Composita, Tinctura Myrrhæ. Of the Tincture, Tinctura Aloes Composita.

Medicinal Uses of the Tincture.—Tonic. Deobstruent. Dose, fʒss. to fʒj. It is, however, rarely used internally, but is employed as an external application to foul ulcers, and when diluted with water as a lotion for spongy gums.

TINCTURA OPII.

Tincture of Opium.

Tinctura Opii, P.L. 1788, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Opium, powdered, three ounces,
Proof Spirit two pints;
Macerate for seven days, then press out and strain.

Remarks.—This tincture is of a deep brownish red colour, and possesses the peculiar odour and taste of opium. Its specific gravity I find to be about 0·952, when prepared with proof spirit, as directed in the Pharmacopœia; about 19 minims contain one grain of solid opium; this was proved by boiling down the tincture, and also by determining the quantity of opium left undissolved. Proof spirit is a much better solvent of opium than cold water; for the latter dissolves less than 3-7ths of the opium, whereas proof spirit, as I found in preparing the tincture, dissolves more than 2-3rds of it.

Incompatibles.—This tincture is decomposed by ammonia, potash, soda, and their carbonates, morphia being precipitated; most metallic salts, and tincture of galls, also decompose it.

Pharmacopœia Preparations.—Enema Opii, Linimentum Opii.

Medicinal Use.—Narcotic. As 19 minims contain one grain of opium, the quantity exhibited must depend upon that of the opium which it is intended to give. Its dose is generally stated to be from ♏x. to ♏lx. It is given in preference to opium in substance, in cases of accident or of sudden and extreme pain; it is sometimes preferred to solid opium in chronic cases, on account of the facility with which the dose may be apportioned and varied according to circumstances. It is externally employed as an anodyne in lotions.

TINCTURA QUINÆ COMPOSITA.

Compound Tincture of Quina.

Take of Disulphate of Quina five drachms and a scruple,
Tincture of Orange two pints;
Digest for seven days, or until it is dissolved, and strain.

Remarks.—It will hasten the solution if the mixture be put in a warm place; the whole of the quina salt should be dissolved, and then this tincture will contain one grain of the disulphate in a fluidrachm.

Medicinal Use.—See Decoctum Cinchonæ Rubræ, pp. 159 and 163. Dose, fʒij. to f℥j.

TINCTURA RHEI COMPOSITA.

Compound Tincture of Rhubarb.

Tinctura Rhabarbari Composita, P.L. 1788.
Tinctura Rhei Composita, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Rhubarb, sliced, two ounces and a half,
Fresh Liquorice [*root*], bruised, six drachms,
Ginger, bruised,
Saffron, each three drachms,
Proof Spirit two pints;
Macerate for seven days, then press out and strain.

Medicinal Uses.—Purgative. Stomachic. Dose, fʒij. to f℥jss.

TINCTURA SCILLÆ.

Tincture of Squill.

Tinctura Scillæ, P.L. 1788, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Squill, fresh-dried, five ounces,
Proof Spirit two pints;
Macerate for seven days, then press out and strain.

Medicinal Uses.—Expectorant. Diuretic. Dose, ♏x. to ♏xxx.

TINCTURA SENNÆ COMPOSITA.

Compound Tincture of Senna.

Elixir Salutis, P.L. 1721.
Tinctura Senæ, P.L. 1746.
Tinctura Sennæ, P.L. 1788, P.L. 1809, P.L. 1824.
Tinctura Sennæ Composita, P.L. 1836.

Take of Senna three ounces and a half,
Caraway, bruised, three drachms and a half,
Cardamom, bruised, a drachm,
Raisins, stoned, five ounces,
Proof Spirit two pints;
Macerate for seven days, then press out and strain.

Medicinal Uses.—Stomachic and purgative. Dose, fʒij. to f℥j.

TINCTURA SERPENTARIÆ.

Tincture of Serpentary.

Tinctura Serpentariæ Virginianæ, P.L. 1721.
Tinctura Serpentariæ, P.L. 1746, P.L. 1788,
P.L. 1809, P.L. 1824, P.L. 1836.

Take of Serpentary, bruised, three ounces and a half,
Proof Spirit two pints;
Macerate for seven days, then press out and strain.

Medicinal Uses.—Tonic. Diaphoretic. Dose, fʒi. to fʒiij.

TINCTURA TOLUTANI.

Tincture of Tolu.

Tinctura Balsami Tolutani, P.L. 1788, P.L. 1836.

Take of Balsam of Tolu two ounces,
Rectified Spirit two pints;
Macerate until the Balsam is dissolved, and strain.

Medicinal Use.—Employed in old coughs and catarrhal affections.

TINCTURA VALERIANÆ.

Tincture of Valerian.

Tinctura Valerianæ Simplex, P.L. 1746.
Tinctura Valerianæ, P.L. 1788, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Valerian [*root*], bruised, five ounces,
Proof Spirit two pints;
Macerate for seven days, then press out and strain.

Medicinal Use.—Antispasmodic. Dose, from fʒi. to fʒiij. It is seldom employed except as an adjunct to the Infusion of Valerian.

TINCTURA VALERIANÆ COMPOSITA.

Compound Tincture of Valerian.

Tinctura Valerianæ Volatilis, P.L. 1746, P.L. 1788.
Tinctura Valerianæ Ammoniata, P.L. 1788, edit. alt.,
P.L. 1809, P.L. 1824.
Tinctura Valerianæ Composita, P.L. 1836.

Take of Valerian [*root*], bruised, five ounces,
Aromatic Spirit of Ammonia two pints;
Macerate for seven days, then press out and strain.

Medicinal Use.—Antispasmodic. Dose, fʒss. to fʒj. It is more powerful than the simple tincture, on account of the carbonate of ammonia it contains. It is incompatible with acids, and with acidulous, metallic, and earthy salts.

TINCTURA ZINGIBERIS.

Tincture of Ginger.

Tinctura Zingiberis, P.L. 1788, edit. alt.,
P.L. 1809, P.L. 1824, P.L. 1836.

Take of Ginger, bruised, two ounces and a half,
Rectified Spirit two pints;
Macerate for seven days, then press out and strain.

Medicinal Uses.—Stimulant. Carminative. Dose, fʒi. to fʒij. It is useful in gout when it attacks the stomach, and in flatulent colic, and as a corrigent to griping purgatives.

VEGETABILIA PRÆPARATA.

PREPARED VEGETABLE SUBSTANCES.

Remarks.—In some former Pharmacopœias, general directions were given for freeing several of the vegetable substances inserted in Materia Medica from the impurities and inert matter with which they are mixed, as met with in commerce; in the present work specific methods have been ordered, by which this requisite purification may be accomplished.

AMMONIACUM PRÆPARATUM.

Prepared Ammoniacum.

Take of Ammoniacum, in small lumps, a pound,
Water as much as may be sufficient to cover the Ammoniacum;

Boil the Ammoniacum with the Water until they are mixed. Strain the mixture through a hair-sieve, and evaporate it in a water-bath, stirring constantly, that it may be hard when cold.

Remarks.—AMMONIACUM, called also *gum-ammoniac*, is a resin obtained from a plant belonging to the natural family *Umbelliferæ*; it is met with in tears and lumps, of a pale reddish or brownish-yellow colour, with a waxy lustre; when broken, the fragments are whitish, somewhat opalescent, opaque or slightly translucent on the edges. Ammoniacum is moderately hard and brittle, but softens by a gentle heat; the odour is faint and unpleasant, and is increased by heat; the taste is bitter, nauseous, and acrid; it burns with a white flame. Water dissolves the gummy matter and spirit the resinous, the glutinous portion is insoluble in ether.

Composition.—According to Braconnot, 100 parts consist of resin 70, gum 18·4, glutinous matter 4·4, water 6, loss 1·2. It also contains traces of an essential oil. The composition of the resin, according to Johnstone, is represented by the formula $C^{40} H^{25} O^{9}$.

Pharmacopœia Preparations.—Emplastrum Ammoniaci, Emplastrum Ammoniaci cum Hydrargyro, Mistura Ammoniaci.

Medicinal Uses.—Expectorant. Stimulant. Antispasmodic, chiefly in chronic catarrh. It is more employed as an external stimulant than internally. Dose, gr. v. to gr. xx. It is usually taken with squills or in mixture.

ASSAFŒTIDA PRÆPARATA.

Prepared Assafœtida.

Make this in the same manner as is directed for PREPARED AMMONIACUM.

Remarks.—ASSAFŒTIDA is a resinous substance also obtained from a plant belonging to the natural family *Umbelliferæ.*

Properties.—Assafœtida occurs in irregular pieces of various sizes; it is at first rather soft, but becomes harder by keeping; it is of a yellowish or reddish-brown colour. When broken the fragments are conchoidal, whitish, translucent with a waxy lustre; by exposure to light and air the colour becomes reddish, and this afterwards passes into yellowish or reddish-brown. Sometimes it occurs in roundish or flattish oval tears, which smell less strongly than the lump.

The odour of assafœtida is strongly alliaceous, and its taste is bitter and acrid; water dissolves the gum and forms an emulsion with the insoluble portion; it is dissolved by alcohol, which solution becomes milky on the addition of water. It softens and melts by heat, and burns with a white flame and much smoke.

Composition.—According to Pelletier's analysis, Assafœtida consists of, Resin 65·00, Arabin 19·44, Bassorin 11·66, Essential oil 3·60, Supermalate of lime and loss 0·30. It also contains a little sulphur.

Johnstone considers the resin of assafœtida to be a mixture of two distinct resins, one of which, A, is represented by the formula $C^{40} H^{26} O^{19}$, the other the B resin, by $C^{40} H^{26} O^{9}$.

Hlasiwetz regards the essential oil of assafœtida as composed of two sulphurets of the hydrocarbon $C^{12} H^{11}$, and states that when freshly distilled it contains no oxygen; it is however probable that this oil is identical with the essential oils of black mustard and of horseradish. Essential oil of Assafœtida is colourless or yellowish and lighter than water; it is soluble in alcohol and in ether, and slightly in water; its taste is at first mild, then pungent; it does not stain the skin red; it is a neutral substance, but when kept or exposed to air becomes slightly acid, disengaging hydrosulphuric acid gas, which is also the case when it is boiled. This oil does not solidify when exposed to a freezing mixture. It decomposes if distilled from or kept in metallic vessels, and gives rise to numerous compounds when brought into contact with various reagents.

Adulterations, &c.—Assafœtida is adulterated with other resins and earthy matters; the latter are readily detected by incinerating a small quantity of the suspected resin. The physical characteristics of this resin above given, will point out sophistication by other kinds.

Incompatibles.—Most metallic salts.

Pharmacopœia Preparations.—Of the crude resin, Spiritus Ammoniæ Fœtidus, Tinctura Assafœtidæ, Assafœtida Præparata. Of the prepared resin, Enema Assafœtida, Pilula Galbani Composita.

Medicinal Uses.—Stimulant and antispasmodic in doses of gr. x. to gr. xxx. in pills or as an emulsion.

CASSIA PRÆPARATA.

Prepared Cassia.

Take of Cassia, broken lengthwise, a pound,
Distilled Water, as much as may be sufficient to cover the Cassia;

Macerate for six hours, frequently stirring; strain the watery pulp through a hair-sieve, and evaporate in a water-bath to the consistence of a confection.

Remarks.—Cassia is the fruit of a tree belonging to the natural family *Leguminosæ*; it is a dark-brown, slightly curved, cylindrical, woody pod, from about 8 to 24 inches in length, and 1 inch in thickness. Internally it is divided into numerous transverse cells each of which contains a seed embedded in the soft black pulp.

If the seed should rattle in the pods when shaken, it shows that they are unfit for use.

The pulp is blackish, inodorous, and has a faint sweetish taste; water almost entirely dissolves it, and its laxative principle is soluble in alcohol; it contains a large proportion of sugar, on which account it is apt to undergo the acetous fermentation when exposed to the air; some gum and impure tannic acid also enter into its composition; but no principle has yet been isolated which will account for its purgative power. It should be free from acidity or mouldiness.

Pharmacopœia Preparations.—Confectio Cassiæ, Confectio Sennæ.

Medicinal Uses.—It is mildly laxative, but is now seldom employed by itself.

GALBANUM PRÆPARATUM.

Prepared Galbanum.

Prepare this by the same method which is directed for PREPARED AMMONIACUM.

Remarks.—GALBANUM is the product of another plant belonging to the natural family *Umbelliferæ*; like the other resins it is met with in tears and in lumps; its colour is generally greenish yellow, but varies greatly, it is sometimes opaque, sometimes translucent; its taste is hot, bitter, and disagreeable, and its odour peculiar and powerful. It consists of a mixture of gum and resin, and yields an essential oil by distillation with water which is colourless and very mobile, smelling somewhat like camphor. Johnstone assigns the formula $C^{40} H^{27} O^{7}$ to its resin. Galbanum softens but is not liquefied by heat, is soluble in proof spirit, and forms an emulsion with water.

Adulterations and Tests.—Good Galbanum is recognized by the above qualities; as imported, it is frequently mixed with other resins. The preceding remarks apply to the Galbanum imported from the Levant. That obtained from Persia differs so widely from it as to suggest the belief that the Persian Galbanum is a distinct substance.

Pharmacopœia Preparations.—Emplastrum Galbani, Galbanum Præparatum, Pilula Galbani Composita.

Medicinal Uses.—Stimulant and Antispasmodic. Dose, gr. x. to gr. xx.

PIX BURGUNDICA PRÆPARATA.

Prepared Burgundy Pitch.

Prepare this by the same method which is directed for Prepared Ammoniacum.

Remarks.—Burgundy Pitch is stated to be the produce of the *Abies excelsa*, a tree belonging to the natural family *Pinaceæ*; the same tree is also said to produce Frankincense; these two resins however differ considerably and are evidently distinct substances, for their resemblance is confined to colour, their scent differing greatly, as also their locality and mode of preparation; for whilst frankincense is chiefly the produce of Canada, and appears to be a direct exudation from the tree, Burgundy Pitch is a peculiar turpentine, sometimes mixed with its own colophony or "rosin," which is largely produced and consumed in France, being chiefly obtained from the district of that country formerly, and even yet, known as Burgundy. It would therefore seem that soil and climate have in this case considerably modified the product of the same tree.

Burgundy Pitch is brittle at low temperatures but softens by warm water or even by the heat of the hand, it is opaque, of a pale yellow colour and terebinthine odour, but possesses a far more powerful and aromatic smell than that of common turpentine, and a sweetish somewhat agreeable taste.

When the fresh wood of the *Abies excelsa* is distilled with water, a thin colourless oil is obtained, of an odour quite distinct from that of oil of turpentine; when highly rectified, the scent of this oil resembles a mixture of oils of orange and lemon, its specific gravity is 0·856, and its boiling-point 353°. Its composition is identical with that of essential oil of turpentine.

Adulterations, &c.—Burgundy Pitch is often fictitious, being made in Liverpool from colophony or from turpentine which has been long kept, mixed with yellow-ochre, &c.; this is generally of a brighter yellow, and its odour is disagreeable and unlike that of the genuine drug, which is sometimes met with in commerce.

Pharmacopœia Preparations.—Emplastrum Cumini, Emplastrum Picis, Pix Burgundica Præparata.

Medicinal Use.—As an external stimulant in the form of plaster.

PRUNUM PRÆPARATUM.

Prepared Prune.

Take of the Prune a pound,
Water as much as may be sufficient to cover the Prune;

Boil gently for four hours. Press out the softened pulp, first of all through an open sieve made of cane, then through a fine hair-sieve. Lastly, evaporate in a water-bath to the consistence of a confection.

Remarks.—The Prune is the fruit of a well-known tree belonging to the natural family *Rosaceæ*. The finer sorts used for the table are imported under the names of Imperials, Bordeaux, or French plums. Prune-pulp consists of sugar, gum, vegetable acids, water, &c.

Pharmacopœia Preparations.—Confectio Sennæ, Prunum Præparatum.

Medicinal Use.—Slightly laxative, and to cover the nauseous taste of other drugs.

SAGAPENUM PRÆPARATUM.

Prepared Sagapenum.

Prepare this by the same method which is directed for Prepared Ammoniacum.

Remarks.—Of the source of Sagapenum nothing certain is known, but like most of the resins of its class, it is probably derived from a plant belonging to the natural family *Umbelliferæ*; it is chiefly imported from the Levant, in opaque or somewhat translucent masses of a brown colour; its taste is hot and acrid; when heated, its odour resembles that of assafœtida, but it is less fœtid and more aromatic and pleasant. It consists of resin, gum, and an essential oil. Sagapenum resin is of a pale yellow colour, powerful alliaceous smell, and liquefies at 212°. Its composition is represented by the formula $C^{40} H^{29} O^{9}$.

Adulterations, &c.—Like most other resins, Sagapenum is adulterated with inferior or fictitious resins.

Pharmacopœia Preparations.—Confectio Rutæ, Pilula Galbani Composita, Sagapenum Præparatum.

Medicinal Use.—Antispasmodic. Dose, gr. v. to gr. xx.

STYRAX PRÆPARATA.

Prepared Storax.

Take of Storax a pound,
Rectified Spirit four pints;
Dissolve and strain through linen; then with a gentle heat distil the greater portion of the Spirit, and evaporate the residuum in a water-bath to a proper consistence.

Remarks.—STORAX is a fragrant balsamic exudation from a tree belonging to the natural family *Ebenaceæ*; the description called "liquid Storax," is that directed by the College to be employed; this is a viscid dark-coloured liquid with a pleasant scent, especially when heated. When distilled with water Storax yields a limpid and colourless essential oil, termed *Styrol*, which exists in two allotropic conditions; its odour is penetrating, resembling naphthalin and storax, and its taste acrid; it is very volatile, boils at 294°, and is not decomposed when its vapour is passed through a red-hot tube. It dissolves in ether, alcohol, pyroxylic spirit, &c., and very slightly in water. It is neutral to test paper. It is a bicarburet of hydrogen, consisting of

Sixteen equivalents of Carbon ..	$6\times16=96$	or	92·8
Eight „ of Hydrogen	$1\times 8= 8$	„	7·2
Equivalent......	104.		100·

Formula...... $C^{16} H^{8}$.

Storax also contains cinnamic acid.

Adulterations, &c.—Storax is of course frequently adulterated, and is the more liable to it as the genuine drug does not always present the same appearance. Its scent, taste, and viscidity are its best characteristics.

Pharmacopœia Preparations.—Pilula Styracis Composita, Tinctura Benzoini Composita, Styrax Præparata.

Medicinal Use.—Expectorant.

TAMARINDUS PRÆPARATUS.

Prepared Tamarind.

Take of the Tamarind a pound,
Water as much as may be sufficient to cover the Tamarind;

Macerate with a gentle heat for four hours; and finish off in the same manner which is directed for PREPARED PRUNE.

Remarks.—The TAMARIND is the fruit of an East and West Indian tree belonging to the natural family *Leguminosæ*. As imported, tamarinds consist of a reddish-yellow or brown pulp, intermixed with bright chestnut-red seeds and vegetable fibres. The pulp chiefly consists of sugar, various vegetable acids, particularly the tartaric, and water.

Adulterations, &c.—Sugar and sulphuric acid are stated to be used for this purpose; the latter is readily detected by the voluminous precipitate, insoluble in nitric acid, chloride of barium gives with a clear solution of the acidified tamarind in water. Copper is sometimes present, an impurity derived of course from the preserving pans; a bright iron spatula plunged in the pulp will detect this metal.

Pharmacopœia Preparations.—Confectio Cassiæ, Confectio Sennæ, Tamarindus Præparatus.

Incompatibles.—Alkalis, earths, alkaline and earthy carbonates, salts of lime and lead, &c.

Medicinal Uses.—Refrigerant and gently laxative. Tamarind dissolved in water, or about ℥ij. mixed with milk and boiled, yields a very pleasant cooling drink for use in fevers, &c.

THUS PRÆPARATUM.

Prepared Frankincense.

Take of Frankincense a pound,
Water as much as may be sufficient to cover the Frankincense;

Boil the Frankincense with the Water until it liquefies, and strain through a hair-sieve: then, when cold, the water being poured off, keep the Frankincense for use.

Remarks.—FRANKINCENSE is usually described as identical with, and indeed to be, Burgundy pitch in its crude state; both resins appear to be derived from the same tree, and if so, are greatly modified by climate, soil, or mode of preparation. See p. 482.

Frankincense occurs in lumps and tears of a yellow or brownish colour, and pleasant terebinthine odour. It is frequently adulterated with a mixture of common resin and turpentine somewhat changed by keeping.

Pharmacopœia Preparations.—Emplastrum Ferri, Emplastrum Galbani, Emplastrum Opii, Emplastrum Picis, Emplastrum Potassii Iodidi.

Medicinal Use.—As an external stimulant.

There are a few articles of the Materia Medica which are not employed in any of the Preparations of the Pharmacopœia, and I shall therefore insert some remarks upon them as an *Appendix* to this section.

ABSINTHIUM, *Wormwood*, is an indigenous plant belonging to the natural family *Compositæ*; it contains both phosphoric and malic acid. *Absinthin*, its bitter principle, is a colourless and partially crystalline substance, very soluble in alcohol, in ether, and in alkaline solutions; from the last it is precipitated by their carbonates, the solution in acetic acid is decomposed by water.

By sulphuric acid absinthin is rendered of a deep yellow colour, which gradually becomes purple. It combines by double decomposition with many metallic oxides, forming insoluble compounds with some of them.

Essential Oil of Wormwood, according to Leblanc, is before rectification a deep green-coloured liquid, which begins to boil at 356°, and when rectified boils at 401°. It has a penetrating odour and burning taste. It is decomposed by hydrate of potash, but not by alkaline solutions; it consists of

Twenty	equivalents of Carbon ..	6×20=	120	or 78·96
Sixteen	,, of Hydrogen	1×16=	16	,, 10·52
Two	,, of Oxygen ..	8× 2=	16	,, 10·52
	Equivalent........		152.	100·

Formula...... $C^{20} H^{16} O^{2}$.

Incompatibles.—The preparations of iron.

Medicinal Uses.—Anthelmintic. Tonic. Dose, of the powder, ʒss. to ʒj. exhibited as an infusion.

CAROTA, the *common Carrot,* belongs to the natural family *Umbelliferæ,* and is too well known to require any description; the root contains some fixed oil, sugar, starch, &c., and a crystalline substance *Carotin,* which is obtained in small crystals of a copper-red colour, and of a faint pleasant odour; it is heavier than water, insoluble in that menstruum, almost so in alcohol, and but slightly soluble in ether. It is a hydrocarbon the composition of which is represented by the formula $C^{5} H^{5}$.

Medicinal Use.—As a cataplasm, applied to foul and gangrenous sores.

MUCUNA, *Cowhage,* is the hairy down of the pods of a shrub belonging to the natural family *Leguminosæ.*

Medicinal Uses.—As an anthelmintic; mixed with syrup to the consistence of honey, a tea or tablespoonful of this is exhibited for three successive mornings, fasting, followed by some strong purgative after the last dose.

PETROLEUM, or *Barbadoes Tar,* is a mineral product exuding from the earth, especially in the islands of Barbadoes and Trinidad, and often occurs floating on the surface of the lakes and springs of those countries where it occurs; it is of a blackish brown colour, viscid consistence, bituminous smell and pungent taste. Its specific gravity is variable, but is usually about 0·878. When distilled it yields a very pure naphtha, or liquid hydrocarbon, used for preserving potassium, &c. from oxidation. The solid constituent is *Asphaltum*, or mineral pitch.

Medicinal Uses.—Anthelmintic. Exhibited as an emulsion in cases of tape-worm, and in diseases of the skin as an ointment.

PYRETHRUM, *Pellitory of Spain*, belongs to the natural family *Compositæ*; the root is met with in cylindrical pieces of about three inches long, with a dark brown bark spotted with black. It contains an acrid resin *Pyrethrin*, tannic acid, &c.

Medicinal Use.—As a masticatory. When chewed it produces a singular pricking sensation.

AVENA, the *Oat*, is the well-known seed of the *Avena sativa*, or common oat, belonging to the natural family *Graminaceæ*. When deprived of the husk it is called *groats*, these when crushed *Embden groats*, and when ground, *oatmeal*.

According to Vogel, oats consist of 66 per cent. of meal, and 36 per cent. of husk; oatmeal consists of starch, sugar, mucilage, albumen, &c., but it is said no gluten.

Medicinal Use.—*Gruel* made from groats is a mild, nutritious, and easily digested food in fevers, &c. *Porridge* made from oatmeal is an admirable staple article of diet, too little used in England.

MARANTA, *Arrowroot*, is the starchy constituent of the *Maranta arundinacea*, belonging to the natural family *Marantaceæ*; the best is that imported from the West Indies, which is a white and somewhat arenaceous powder, containing several small readily crushed lumps, and destitute of smell or taste. When crushed between the fingers it has a peculiar grating, almost brittle feel. It is a very pure variety of starch, and yields a transparent jelly with boiling water. It possesses the usual properties of wheaten starch, see pp. 155–56, with which it is identical in composition.

Adulterations, &c.—It is usually adulterated, as met with in the shops, with potato starch, and inferior kinds of arrowroot. Microscopic examination is the best test, the starch-granules of arrowroot being smaller and differently shaped than those of most other starches, and forming transparent mixtures with boiling water.

Medicinal Uses.—See AVENA.

SAGO is the starchy globular granules obtained from the pith of several species of the natural family *Palmaceæ*. Several varieties of sago are met with in commerce, of which *pearl-sago* is the best. In its properties, adulterations, and uses, it resembles arrowroot, and is too well known to require further notice.

AURANTII FLORIS AQUA, *Orange-flower Water*, is obtained by distilling the blossoms of the Orange, a tree belonging to the natural family *Aurantiaceæ*. It is imported from France and Italy; it is colourless, and has a most delicate and agreeable flavour and scent, on which account it is employed. It usually contains some little free acid derived from the flowers, from which impurity it might advantageously and easily be freed during distillation, and owing to which, if kept in metallic vessels, it sometimes acquires metallic impregnation, which hydrosulphuric acid will detect.

Its fragrance is owing to an essential oil, commonly called "Oil of Neroli," which however Soubeiran regards as a modification of the essential oil existing in the orange-flower. Oil of Neroli is of a yellowish-red colour, changing to red-brown by keeping; its scent when diffused in spirit is delightful; this oil is one of the chief perfumes used in making the best Eau de Cologne. It is frequently adulterated with oil of "Petit Grain," an oil distilled from the leaves of the orange-tree, and with alcohol, &c. See note at the end of section AQUÆ.

BALSAMUM PERUVIANUM, *Balsam of Peru*, is obtained from the bark of the *Myrospermum Peruiferum*, a tree belonging to the natural family *Leguminosæ*, and imported from Valparaiso, and several other places.

Properties.—It is a dark reddish-brown liquid, of the consistence of treacle; its odour is agreeable and somewhat similar to that of benzoin; its taste is bitterish, aromatic, and acrid; its specific gravity is from 1·150 to 1·160. It does not dry by exposure to the air; when boiled in water it yields cinnamic acid, and an essential oil *cinnamein*, which distils over, this is liquid, almost inodorous, and heavier than water; it is identical in composition with oil of cinnamon, p. 117, and like it yields *cinnamic acid* when acted on by some reagents; Frémy has isolated another volatile oil, *peruvin*, by acting on cinnamein by hydrate of potash, which contains more hydrogen than cinnamein. The great resemblance of the various educts and products yielded by Storax, Balsam of Tolu, Balsam of Peru, and Oil of Cinnamon, to which perhaps Benzoin may be added, when acted upon by various reagents, seems to point to the probability of the isomerism, if not the identity of the radicals of these substances.

Balsam of Peru is entirely soluble in alcohol, but only partially so in ether; it is inflammable, and burns with a fuliginous flame.

Medicinal Uses.—Stimulant and expectorant in chronic catarrhs. Dose, from ♏xv. to ♏xxx. made into an emulsion. Externally it is applied to indolent ulcers.

CAJUPUTI, *Essential Oil of Cajuput,* is distilled from the leaves of the *Melaleuca minor*, a tree growing in the Molucca Islands, belonging to the natural family *Myrtaceæ.*

Properties.—It is very liquid, transparent, and of a green colour; when rectified the first distilled portion is colourless; it has a strong penetrating smell, resembling that of a mixture of camphor and cardamom; its taste is aromatic, succeeded by a sensation of coolness; the specific gravity varies from 0·914 to 0·927; it is entirely soluble in alcohol, and boils at 343°.

Composition.—According to Blanchet, Oil of Cajuput consists of

Ten equivalents of Carbon	...... 6×10=60	or	77·92
Nine ,, of Hydrogen	.... 1× 9= 9	,,	11·69
One ,, of Oxygen	 8	,,	10·39
Equivalent	...... 77·		100·

Formula.... $C^{10} H^{9} O$.

Impurities and Tests.—It is said to have been adulterated with camphor and oil of rosemary flavoured by cardamom, and coloured by a salt of copper; the latter may be detected by ammonia, which gives a purple solution with it.

Medicinal Uses.—Diffusible Stimulant, Antispasmodic; externally in rheumatism. Dose, ♏iij. to ♏v. on Sugar.

COPAIBA, *Copaiva,* is a liquid balsam obtained from various species of *Copaifera,* trees belonging to the natural family *Leguminosæ*; this is a transparent, amber-yellow, or brownish-oleaginous liquid, with a peculiar scent, and bitter, hot, disagreeable taste; its specific gravity varies from 0·950 to 0·970.

Properties.—The transparent balsam is almost wholly soluble in alcohol, and forms a kind of emulsion with caustic potash. When distilled with water it yields a large quantity of *Essential Oil of Copaiva,* this is colourless and transparent; its specific gravity is 0·885, it boils between 482° and 509°, it is soluble in alcohol and in ether, and is isomeric with oil of turpentine, its formula being $C^{10} H^{8}$.

Copaivic Acid is the resin which remains after the distillation of the essential oil, mixed with a neutral resin, from which it may be separated by naphtha; it crystallizes from its alcoholic solution, which reddens litmus paper, in prismatic tufts, and forms salts with bases. According to Rose it consists of

Forty-five equivalents	of Carbon	6 × 45 =	270	or 79·64
Thirty-five „	of Hydrogen ..	1 × 35 =	35	„ 10·33
Four „	of Oxygen....	8 × 4 =	32	„ 10·03
		Equivalent......	337.	100·

Formula...... $C^{45} H^{35} O^{4}$.

Adulterations and Tests.—Copaiva is constantly adulterated, and there are so many varieties imported, some of which are soluble in alcohol, ether, ammonia, &c., whilst others are almost insoluble in these and other menstrua, that it is difficult to point out any ready and decisive tests. If adulterated with turpentine, a terebinthine smell will detect its presence, especially if the oil be heated.

Medicinal Uses.—Stimulant in gonorrhœa. Dose, ♏x. to fʒj. It is sold enclosed in capsules of gelatine containing about ♏x. each; the balsam contained in these is often spurious. Dose of the Oil, ♏x. to ♏xxx.

MORRHUÆ OLEUM, *Oil of Cod*, is both imported and procured in this country from the livers of the Cod fish, *Gadus Morrhuæ.* When properly prepared it is a transparent, pale straw-coloured oil, with the odour of the boiled fish, and an oily, scarcely unpleasant taste. The dark-coloured, strong-smelling, or rancid oils are unfit for use.

Composition.—Cod-liver oil, according to Dr. Jongh, principally consists of oleate and margarate of glycerin, some biliary matter, with traces of butyric, acetic, and other organic acids, traces of iodine, and bromine, and a very minute quantity of resinous-like matter termed by him *Gaduin*; but as the colour of the oils described varied from golden-yellow to dark-brown, in which latter the gaduin amounted to some six times the quantity which the former contained, it is most likely that this gaduin is merely an impurity arising from partial decomposition of the oil, and has no claim to be looked upon as an essential constituent of it. Cod-liver oil may therefore be regarded when pure as composed of oleate and margarate of glycerin, containing traces of alkaline salts.

Adulterations and Tests.—This oil is of course very liable to adulteration with any other fish or animal oils, which are nearly destitute of colour, taste and smell. Any tests to detect these I regard as unavailing; sulphuric acid, which has been recommended, only detects the biliary impurity, and this could readily be added to a sophisticated oil. Colour, scent and taste are the sole tests of purity which can be in any way relied on.

Medicinal Uses.—Within the last ten years the consumption of this oil in cases of phthisis has been rapidly on the increase, and by many cod-liver oil seems to be looked upon as a specific for the early stages of this disease. It has also been administered in numerous other complaints. Dose, fʒij. to f℥j. twice or thrice a day.

RICINI OLEUM, *Castor Oil*, obtained by expressing the seeds of the *Ricinus communis*, a plant belonging to the natural family *Euphorbiaceæ*, is a viscid, pale, yellow, or colourless oleaginous liquid of a slight, but nauseous smell and taste; its specific gravity varies from 0·96 to 0·969. It solidifies when exposed to the zero of Fahrenheit. It is completely soluble in ether and in alcohol; it is saponified by the alkalis, and, according to Bussy and Lecanu, consists of ricino-stearin, ricino-olein, and ricinin, which, by saponification or distillation, yield glycerin and three distinct oily acids: these are—

Ricinic Acid, which solidifies at 50°, liquefies at 70°, and volatilizes at a somewhat higher temperature; it is insoluble in water, soluble in alcohol, and in ether, reddens litmus paper, and forms definite salts with the metallic oxides. Its formula is $C^{24} H^{19} O^{4}$.

Ricin-oleic Acid (elaiodic acid) is a yellow oily liquid of an acrid taste, insoluble in water, but soluble in alcohol.

Ricino-stearic Acid (margaritic acid), when purified by boiling alcohol, occurs in inodorous, tasteless, nacreous scales, insoluble in water, but the alcoholic solution reddens litmus paper; it fuses at 266°, and forms definite salts with the alkalis and metallic oxides. This acid is represented by the formula $C^{22} H^{21} O^{3}, HO$.

This constitution of castor oil is however disputed. By the action of various reagents on castor oil several products are obtained, respecting which I refer to chemical authors.

Adulterations and Tests.—As castor oil is completely soluble in alcohol, most adulterants can readily be detected. It however appears not to be often sophisticated; when rancid, castor oil should never be employed.

Medicinal Uses.—As a mild but efficient purgative. Dose, fʒss. to f℥ij. in some aromatic water or tincture.

TIGLII OLEUM, *Croton oil*, is also expressed from the seeds of a tree belonging to the natural family *Euphorbiaceæ* ; it is rather more viscid than castor oil, of a pale yellow tint, faint smell and acrid taste; the imported oil is insoluble in cold alcohol, but that expressed in this country is both soluble in cold alcohol and of a much darker colour than the imported variety.

Croton oil has been examined by Pelletier and Caventou, and by Brandes, who agree in its containing, besides a fixed oil, *Crotonic acid*; this is a volatile substance solidifying at 40°, but yielding vapours at about 32°, possessing a nauseous and irritating smell; to this substance the painful effects, often experienced by those engaged in expressing this oil, are doubtless to be attributed. But little appears to be known respecting the chemical characters and properties of this drug, and nothing respecting its purgative principle.

Adulterations and Tests.—It does not appear to be liable to adulteration; if mixed with any oil, excepting castor oil, and heated with its own bulk of alcohol, it will not form an uniform transparent mixture.

Medicinal Use.—It is a most powerful and dangerous cathartic. Dose, ♏j. to ♏ij. in pills.

TEREBINTHINA CHIA, *Chia Turpentine*, is a liquid resin which exudes from the *Pistacia terebinthus*, a native of the south of Europe and the Greek Islands, belonging to the natural family *Anacardiaceæ*. It is a very viscid, greenish-yellow substance of a rather pleasant though terebinthine smell and slightly bitterish warm taste; like the other liquid resins it consists of an essential oil and a solid resin. It thickens by exposure to air, by the loss or oxidation of its essential oil. Respecting its chemical properites little or nothing seems to be known.

Adulteration.—Genuine Chian turpentine is rarely met with, Venice turpentine being usually sold instead of it.

Medicinal Uses.—As common Turpentine, see p. 182.

CARBO ANIMALIS, *Animal Charcoal*, is directed to be made by calcining bullocks' blood; that met with in commerce is usually obtained by igniting bones to redness in close vessels, so as to completely char them, and when cold, grinding them to coarse powder for the use of sugar-refiners and others requiring a decolorizing agent. The impurities contained in the animal charcoal of commerce, when this is required for chemical purposes, usually render it necessary to purify it by digestion with hot diluted hydrochloric acid, washing till free from acid, and drying. Its decolorizing power will be much increased by subsequently heating it to dull redness in a carefully covered and luted crucible, and in the preparation of many of the costly vegetable alkaloids, &c. this is important, as the less animal charcoal used to effect decolorization of the liquids the better; it having been proved by Warington and others that animal charcoal possesses the property of abstracting portions of soluble substances from their solutions. It also possesses deodorizing properties, although to what these singular qualities are to be attributed is yet unknown; some peculiar structure, which like that of cotton, woollen, or linen with dyes, causes the deposition of these salts and colouring matter upon this particular form of charcoal, has been imagined to be the cause of its absorbent qualities.

CORNU USTUM, *Burnt Horn*, as usually met with, is nothing more than *bone-ash*, from which the ashes of horn differ very slightly in composition. Bone-ash consists of carbonate of lime, and of a peculiar phosphate of lime, hence called *bone-phosphate*; this phosphate also occurs native, sometimes as the constituent of mountains, as in Spain, and also in most vegetables, especially the cereals. According to Berzelius bone-phosphate consists of

Eight equivalents of Lime	$28 \times 8 = 224$	or	50·9
Three ,, of Phosphoric Acid	$72 \times 3 = 216$	,,	49·1
Equivalent......	440.		100·

Formula...... $8CaO, 3PO^5$.

The constitution of bone-ash cannot however yet be regarded as determined, many chemists regarding it as a simple tribasic phosphate, the formula of which is $PO^5, 3CaO$.

Medicinal Use.—I am unaware that the ash of horn is of any medicinal use. Bone-ash is employed in the preparation of phosphorus and of phosphate of soda.

HIRUDO.—*The Leech*, as is well known, is used for local blood-letting.

MOSCHUS, *Musk*, is the solidified viscid liquid contained in a small sac situated near the prepuce of the male of an animal inhabiting Northern Asia. When broken up it consists of brown granules, mixed with hairs of a yellowish-white colour. The musk-bag or *pod* is about two and a half inches long by one and a half to three-quarters broad, oviform, but flat and hairy on one side. Musk consists of ammoniacal and fatty substances, but to what principle its singularly powerful and permanent odour is owing is not ascertained. It is frequently adulterated with dried blood, &c.

Medicinal Uses.—Antispasmodic and stimulant. Dose, gr. v. to gr. xx. The Musk Mixture is omitted in the present Pharmacopœia.

Ovi Albumen, *White of Egg.*—Animal albumen, of which this is the purest form met with in nature, is one of the bases of flesh and blood, and occurs in most animal substances. It is soluble in water, but coagulates if the solution be heated from 140° to 165°, according to its strength, and then becomes insoluble in water; it is insoluble in alcohol, in ether, and its solution is coagulated by acids and most salts. It contains both sulphur and phosphorus in small quantities, consisting in 100 parts of

Carbon	55·46
Hydrogen	7·20
Nitrogen	16·48
Oxygen	18·27
Sulphur	2·16
Phosphorus	·43
	100·

For further information on this subject I refer to chemical authors.

Medicinal Use.—As an antidote to mineral poisons, as bichloride of Mercury.

VINA.

WINES.

Medicated Wines should be prepared in stoppered glass vessels, and frequently shaken during maceration.

Remarks.—Wine is often a very convenient menstruum for extracting the medicinal virtues of drugs more perfectly than water would do, and also for preserving them from the decomposition an aqueous solution in most cases so readily undergoes; the slight acid existing in the wine, and sometimes also the alcohol, gives, in many instances, a superior solvent power to wine than water possesses. The variety of wine ordered by the College is Sherry, which when good, contains comparatively but little free acid, or acid salts, and also contains from 14 to 23 per cent. of alcohol; but Cape-wine is, I believe, usually employed in lieu of it, this is generally rather weaker and certainly more acid than the Spanish wine; but I am not inclined to think that the substitution in any way alters the characters of the preparations made with it; still sherry wine as directed should alone be used.

VINUM ALOES.

Wine of Aloes.

Tinctura Hieræ, P.L. 1721.
Tinctura Sacra, P.L. 1746.
Vinum Aloës, P.L. 1788, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Socotrine or hepatic Aloes, rubbed to powder, two ounces,
Canella, powdered, four drachms,
Sherry Wine two pints;
Macerate for seven days, and strain.

Medicinal Uses.—Stomachic, in doses of fʒi. to fʒij. Purgative, f℥i. to f℥ij.

Remarks.—Canella, or Wild Cinnamon, is the inner bark of a tree belonging to the natural family *Meliaceæ*, growing in the West Indies and on the American continent.

Properties.—It occurs in quills which are somewhat twisted, and also in flat pieces. It is hard, of a pale yellowish-white colour, has an aromatic odour, a bitterish acrid taste, and a white granular fracture.

Composition.—No satisfactory analysis has been made of this bark. Its active ingredient appears to be its volatile oil, which is a dark yellow fluid, heavier than water, and of an acrid taste. It also yields a crystallizable, saccharine substance, incapable of fermentation, and to which the name of *Canellin* has been given; it is probably *mannite.*

Medicinal Uses.—It is used as an aromatic addition to purgatives and tonics. Dose, gr. x. to gr. xxx.

Pharmacopœia Preparation.—Vinum Aloes.

VINUM COLCHICI.

Wine of Colchicum [*Meadow Saffron*].

Vinum Colchici, P.L. 1824, P.L. 1836.

Take of the Cormus of Colchicum, dried, eight ounces,
Sherry Wine two pints;
Macerate for seven days, and strain.

Medicinal Use.—Diuretic. Dose, from ♏xxx. to fʒj. It is stated to be a specific in the gout, allaying the pain, and shortening the paroxysm.

VINUM IPECACUANHÆ.

Wine of Ipecacuanha.

Vinum Ipecacoanhæ, P.L. 1746.
Vinum Ipecacuanhæ, P.L. 1788, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Ipecacuanha, bruised, two ounces and a half,
Sherry Wine two pints;
Macerate for seven days, and strain.

Medicinal Uses.—Diaphoretic. Dose, ♏xx. to ♏xl. Emetic. Dose, fʒij. to fʒiv. It is as efficacious an emetic as Vinum Antimonii Potassio-tartratis, and, being milder in its operation, is better adapted for infants, a teaspoonful or fʒss. being administered every ten or fifteen minutes till it operates.

VINUM OPII.

Wine of Opium.

Laudanum Liquidum Sydenhami, P.L. 1721.
Tinctura Thebaica, P.L. 1746.
Vinum Opii, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Extract of Opium two ounces and a half,
Cinnamon, bruised,
Clove, bruised, each two drachms and a half,
Sherry Wine two pints;
Macerate for seven days, and strain.

Remarks.—This preparation differs from the Tinctura Opii, not only in containing aromatics, but also in the use of Extract of Opium. Various circumstances render it difficult to form an estimate of the comparative powers of these preparations; they probably differ but little, for respectable authorities agree in representing their doses as similar. The Vinum Opii must be less disagreeable to most persons than the tincture, not only on account of the aromatics which it contains, but because the opium by purification loses much of its peculiar and disagreeable smell and taste. The *Laudanum* of the older Pharmacopœias was a spirituous extract of Opium, combined with aromatics and antispasmodics, evaporated to form a pill mass.

Medicinal Use.—Narcotic. Dose, ♏x. to f℥i.

VINUM VERATRI.

Wine of Veratrum [*White Hellebore*].

Vinum Veratri, P.L. 1809, edit. alt., P.L. 1824,
P.L. 1836.

Take of Veratrum [*White Hellebore*], sliced, eight ounces,
Sherry Wine two pints;
Macerate for seven days, and strain.

Medicinal Uses.—Emetic and cathartic, acting usually with considerable violence. Dose, ♏v. to ♏x.

Remarks.—VERATRUM, *White Hellebore*, is the root of a plant belonging to the natural family *Melanthaceæ*; as met with in commerce it is a root-stock with dark-brown radicles, which are very acrid and bitter, and in which the medicinal virtues of the root reside. According to Pelletier and Caventou, it contains gallate of *veratria* to which its irritant powers are owing.

Simon has described another alkaloid, *Yervia*, as present in White Hellebore. Yervia is crystalline, forms salts with acids, from the solutions of which it is precipitated by the alkalis; by fusion it loses four eqs. of water. The composition of anhydrous Yervia is represented by the formula $C^{60} H^{45} N^{2} O^{5}$. A third alkaloid *Barytina* has been noticed, respecting which little is known.

VERATRIA is now transferred to Materia Medica. This vegetable alkaloid was originally procured, as its name imports, from the Veratrum Album, but it is now generally, and with greater facility, obtained from *Cevadilla* or *Sabadilla*, the seed (fruit) of the *Helonias officinalis*, or as it is now termed *Asagræa officinalis*, a plant belonging to the natural family *Melanthaceæ*, in which this alkaloid is combined with *veratric acid.*

Instead of the process of the Pharmacopœia of 1836, I insert a method of obtaining veratria recommended by Berzelius.

Process.—Treat the bruised seeds of cevadilla with water containing an ounce of sulphuric acid to each pound of seed, press out and again exhaust with water acidified with half an ounce of sulphuric acid. The clear filtered solutions are to be *exactly* saturated by carbonate of soda or of potash, and evaporated to the consistence of an extract. Exhaust the extract, whilst still warm, with alcohol, distil off the alcohol from the spirituous solution, and treat the residue of this distillation with dilute sulphuric acid, and this acid solution with carbonate of soda; the solution will afford a precipitate long after it shows an alkaline reaction. This precipitate is impure veratria, which may be purified by re-solution in acid and precipitation by an alkali. It is however doubtful whether veratria can be thus obtained in a perfectly pure state, although sufficiently so for pharmaceutical purposes, as it may contain *sabadillia*, another alkaloid described by Couerbe as existing in cevadilla.

Properties.—Veratria has an acrid burning taste, it is inodorous, but is so provocative of violent sneezing that on this account it must be handled very carefully when dispensing it; it possesses alkaline properties, fuses at 240°, and volatilizes at a moderate heat. It is insoluble in cold water, and requires 1000 parts of boiling water to dissolve it; and is more soluble in alcohol than in ether. It may be crystallized by the spontaneous evaporation of its alcoholic solution. The composition of veratria cannot be regarded as determined, as it is doubtful whether this alkaloid has yet been obtained chemically pure, Pelletier and

Dumas representing its composition by the formula $C^{30} H^{24} N O^{6}$, and consequently its equivalent is 266, whilst Couerbe's analysis yields the formula $C^{68} H^{43} N^{2} O^{12}$ and the equivalent 575. The salts of veratria are, like the alkaloid, acrid and burning to the taste, and are usually uncrystallizable; the sulphate, however, may be crystallized.

Veratric Acid is a volatile acid, readily soluble in boiling water and in ether, and forming crystalline salts with the alkalis. The formula of anhydrous veratric acid is $C^{18} H^{10} O^{8}$, and its equivalent 182.

Adulterations and Tests.—According to Vasmer a solution containing 1-3000th of veratria acquires an amethystine tint on the addition of a few drops of fuming sulphuric acid. As with the other alkaloids, the best mode of securing purity is to purchase it of a respectable maker, or to prepare it. For tests see above and MATERIA MEDICA: *Veratria*; it is said often to contain a little lime, this giving a better appearance to the preparation.

Incompatibles.—Acids and acidulous salts, which neutralize it, and tincture of galls. It probably decomposes some earthy and metallic salts by combining with their acid.

Medicinal Use.—This very powerful alkaloid in moderate doses increases all the secretions, and has been thought efficient, carefully exhibited, in gout and rheumatism. Dose, gr. $\frac{1}{8}$ to gr. $\frac{1}{4}$.

UNGUENTA.

OINTMENTS.

Remarks.—Ointments are mixtures of various medicinal substances with fatty matters, and are intended for external use, whether applied by friction or spread on linen, to protect or to excite wounds and sores. They are usually much softer than Cerates, wax being generally omitted, Lard and Suet, sometimes Oil, being used in their preparation.

ADEPS.—Lard is the white soft fat of swine, and has but little smell or taste. Its sp. gr. is 0·9302; its melting-point fluctuates between 80° and 88°; when liquefied it should be perfectly transparent; but if it be intermixed with water, it then has a milky appearance. When exposed to the air it becomes disagreeable in odour, acrid to the taste, and acid to reagents; it is then said to be *rancid*; these changes appear to be owing to the absorption of oxygen. It is partially soluble in alcohol, readily so in ether and in the essential oils; by combining with the alkalis potash and soda it is converted into soap.

According to Braconnot 100 parts of lard yield by proximate analysis 38 of stearin and 62 of olein and margarin; of these substances, which form the greater portion of almost all fixed oils and fats, olein and margarin have been described, see pp. 133–5.

Stearin, which is a component of animal fats and of some oils, is best obtained by mixing melted suet with six times its bulk of ether, and when cold, subjecting the mixture to pressure, and washing the solid residue with ether. It is a *bistearate of glycerin.*

Stearic Acid, which is formed by the saponification of fats, occurs in white crystalline flakes resembling spermaceti; it is insoluble in water, but soluble in alcohol and in ether, especially when boiling. It reddens litmus paper, forms definite salts with several bases, and when solid its specific gravity is 1·01, but in a fused state 0·854, and under peculiar conditions it appears to volatilize unchanged. Distilled under ordinary circumstances, it yields margaric acid and several other products, and when acted on by various reagents gives rise to margaron and stearon, and also to lypic, adipic, and other acids, &c.

Composition.—Stearic acid consists of

Sixty-eight equivalents	of Carbon ..	6×68=408	or	76·68
Sixty-eight "	of Hydrogen .	1×68= 68	"	12·77
Seven "	of Oxygen ..	8× 7= 56	"	10·55
	Equivalent......	532.		100·

Formula...... $C^{68} H^{66} O^{5}$, 2HO.

Impurities.—It will be observed that the College have specially directed that Lard should be free from common salt, which is often added to it to preserve it.

Medicinal Uses.—Lard is emollient. It is used in preparing many of the ointments.

Sevum, suet, also is an ingredient in many ointments. Mutton suet is the description employed by the College. This kind of fat fuses between 100° and 106°, and is soluble in alcohol of specific gravity 0·820. Like lard it consists of stearin, margarin, and olein, with a little peculiar odorous fatty matter called *hircin*, but contains much more stearin than exists in lard.

Medicinal Uses.—Similar to those of lard.

UNGUENTUM ANTIMONII POTASSIO-TARTRATIS.

Ointment of Potassio-tartrate of Antimony.

Unguentum Antimonii Potassio-Tartratis, P.L. 1836.

Take of Potassio-tartrate of Antimony, rubbed to the
finest powder, an ounce,
Lard four ounces;
Rub them together.

Medicinal Use.—Employed in chronic swellings of the joints, particularly after rheumatism.

UNGUENTUM BELLADONNÆ.

Ointment of Belladonna [*Deadly Nightshade*].

Take of Extract of Belladonna a drachm,
Lard an ounce;
Rub them together.

Medicinal Uses.—This is a new preparation, and is employed in painful hæmorrhoidal affections, and in neuralgia.

UNGUENTUM CANTHARIDIS.

Ointment of Cantharides.

Unguentum Cantharidis, P.L. 1788.
Unguentum Lyttæ, P.L. 1809, edit. alt.
Unguentum Cantharidis, P.L. 1824, P.L. 1836.

Take of Cantharides, rubbed to very fine powder, three
ounces,
Distilled Water twelve fluidounces,
Cerate of Resin a pound;
Boil down the Water with the Cantharides to half, and

strain. Mix the Cerate with the strained liquor; afterwards let it evaporate to a proper consistence.

Medicinal Use.—This is sometimes employed for the same purpose as the Ceratum Cantharidis; it is a milder preparation and frequently inefficacious.

UNGUENTUM CETACEI.

Ointment of Spermaceti.

Linimentum Album, P.L. 1746.
Unguentum Spermatis Ceti, P.L. 1788.
Unguentum Cetacei, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Spermaceti five ounces,
White Wax fourteen drachms,
Olive Oil a pint, or as much as may be sufficient;

Being melted together with a slow fire, stir constantly until they become cold.

Medicinal Use.—There is no difference in the properties of this and the Ceratum Cetacei, excepting that the ointment is the softer. They are used for similar purposes.

UNGUENTUM CONII.

Ointment of Conium [*Hemlock*].

Take of the fresh [*leaves of*] Conium,
Lard, each a pound;

Boil the Conium with the Lard, until it becomes crisp; then press through a linen cloth.

Medicinal Uses.—Anodyne. This is a new preparation.

UNGUENTUM CREASOTI.

Ointment of Kreasote.

Unguentum Creasoti, P.L. 1836.

Take of Kreasote half a fluidrachm,
Lard an ounce;
Rub them together.

Remarks.—KREASOTE was first inserted in the Pharmacopœia of 1836; this among various other compounds was discovered in 1830 by Reichenbach, in wood-tar. Kreasote exists in pyroligneous acid, which is impure acetic acid obtained by the destructive distillation and decomposition of wood; but it is best prepared from the portion of the oil distilled from wood-tar, which is heavier than water; the process is too operose and complicated to admit of insertion in this work, and I therefore refer to chemical authors for the details.

Properties.—Kreasote is a colourless, transparent liquid of an oily consistence, which retains its fluidity at 17°. Its sp. gr. is about 1·037; it boils at 397°. Its smell is strong and penetrating, like that of wood smoke, or rather of smoked meat. It is a non-conductor of electricity, refracts light powerfully, and burns with a very sooty flame. Kreasote when mixed with water forms two solutions; one consists of 100 water and 1·25 kreasote; the other of 100 water and 10 kreasote. It combines also, and in all proportions, with alcohol, ether, and naphtha. It is highly antiseptic to meat; and the similar virtue of tar, smoke, and crude pyroligneous acid seems to be derived from the presence of kreasote; its name, from *κρέας, flesh, σώζω, I save,* was suggested by this property.

Kreasote immediately coagulates serum, and a dilute solution of white of egg; it acts energetically upon the animal system; insects and fishes when put into an aqueous solution of kreasote are killed by it, and it destroys vegetation. It possesses neither acid nor alkaline properties, but combines both with acids and alkalis, without however forming very stable compounds with them; it also unites with some elementary bodies, as chlorine, iodine, sulphur, &c. Kreasote is employed in toothache, ulcers, and cutaneous diseases externally, and to check hæmorrhage; and internally as a stimulant, and for the prevention of nausea and vomiting. Its powers have, however, in the opinion of competent judges, been greatly overrated. It is decidedly injurious in inflammatory conditions and structural disease of the stomach, and frequently fails in allaying the sickness dependent on organic diseases, as of the heart and kidneys. Three or four drops added to a pint of ink are said to prevent its becoming mouldy.

Kreasote consists of

Twelve equivalents of Carbon..	$6 \times 12 = 72$	or	75·00
Eight „ of Hydrogen	$1 \times 8 = 8$	„	8·34
Two „ of Oxygen..	$8 \times 2 = 16$	„	16·66
Equivalent......	96.		100·

Formula...... $C^{12} H^8 O^2$.

Adulterations and Tests.—Kreasote is sometimes adulterated with spirit. When pure it is not discoloured by exposure to air; it gives a blue colour to dilute solutions of the sesquisalts of iron. See MATERIA MEDICA: *Creasotum.*

Medicinal Use.—Unguentum Creasoti is employed in mild cases of ringworm, and analogous cutaneous diseases.

UNGUENTUM ELEMI.

Ointment of Elemi.

Unguentum e Gummi Elemi sive *Linimentum Arcæi*, P.L. 1721.

Unguentum e Gummi Elemi, P.L. 1746.

Unguentum Elemi, P.L. 1788.

Unguentum Elemi Compositum, P.L. 1788, edit. alt., P.L. 1809, P.L. 1824.

Unguentum Elemi, P.L. 1836.

Take of Elemi three ounces,
Turpentine two ounces and a half,
Suet six ounces,
Olive Oil half a fluidounce;

Melt the Elemi together with the Suet; then remove them from the fire, and immediately mix with them the Turpentine and the Oil; afterwards press through a linen cloth.

Remarks.—ELEMI is a resin of vegetable origin, but from what natural family of plants it is obtained is as yet uncertain; there are several varieties of Elemi, but it is usually met with in large translucent and yellowish lumps of various degrees of hardness; tis odour is rather pleasant. It is soluble in alcohol but with difficulty, and consists of at least two different resins, one of which crystallizes from its alcoholic solution, and an essential oil, which is colourless, very limpid and of a pleasant scent; its boiling-point is 345°; this consists of a camphor and an oil; its composition is the same as that of oil of turpentine, its formula being $C^{20} H^{16}$. According to Deville it contains two camphors which are isomeric.

Medicinal Use.—Stimulant and digestive. It is used to keep open setons and issues, and as an application to ulcers which do not admit of the use of adhesive straps.

UNGUENTUM GALLÆ COMPOSITUM.

Compound Ointment of the Gall-nut.

Unguentum Gallæ Compositum, P.L. 1836.

Take of the Gall-nut, rubbed to very fine powder, six drachms,
Lard six ounces,
Opium, powdered, a drachm and a half;
Rub them together.

Medicinal Use.—Astringent. Used in hæmorrhoidal affections.

UNGUENTUM HYDRARGYRI.

Ointment of Mercury.

Unguentum Cœruleum, P.L. 1721.
Unguentum Cœruleum Fortius, P.L. 1746.
Unguentum Hydrargyri Fortius, P.L. 1788, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Mercury a pound,
Lard eleven ounces and a half,
Suet half an ounce;

First rub the Mercury with the Suet and a little of the Lard until globules can no longer be seen; then add the remainder of the Lard, and rub them together.

Process.—During trituration with the fatty matter, the mercury is probably reduced to the same state as that in which it exists in Pilula Hydrargyri.

Remarks.—As the preparation of this ointment is an exceedingly tedious operation, various means, and most of them of an objectionable nature, have been resorted to in order to shorten it. Some employ Oleum Sulphuratum, a preparation not contained in the present Pharmacopœia; the use of this, from the well-known power of sulphur in diminishing the effects of mercury, ought always to be reprobated. By others, turpentine is used on account of its tenacity; but this is apt to produce pustules. I have been assured that the admixture of a portion of old ointment greatly facilitates the operation. The ointment contains about half its weight of mercury.

Pharmacopœia Preparations.—Ceratum Hydrargyri Compositum, Linimentum Hydrargyri.

Medicinal Use.—This ointment furnishes a prompt and probably one of the least exceptionable modes of introducing mercury into the system. It is generally applied by rubbing ʒss. to ʒj. on some part of the body where the cuticle is thin, generally in syphilitic cases, on the inside of the thigh; in chronic hepatitis it is usually applied in the region of the liver.

UNGUENTUM HYDRARGYRI AMMONIO-CHLORIDI.

Ointment of Ammonio-chloride of Mercury.

Unguentum e Mercurio Præcipitato, P.L. 1746.
Unguentum Calcis Hydrargyri Albæ, P.L. 1788.
Unguentum Hydrargyri Præcipitati Albi, P.L. 1809,
P.L. 1824.
Unguentum Hydrargyri Ammonio-chloridi, P.L. 1836.

Take of Ammonio-chloride of Mercury two drachms,
Lard three ounces;

Add the Ammonio-chloride to the Lard and rub them together.

Medicinal Uses.—Stimulant and detergent.

UNGUENTUM HYDRARGYRI IODIDI.

Ointment of Iodide of Mercury.

Unguentum Hydrargyri Iodidi, P.L. 1836.

Take of Iodide of Mercury an ounce,
White Wax two ounces,
Lard six ounces;
Add the Iodide to the Wax and Lard melted together, and rub them together.

Medicinal Use.—Used for dressing scrofulous sores.

UNGUENTUM HYDRARGYRI NITRATIS.

Ointment of Nitrate of Mercury.

Unguentum Hydrargyri Nitrati, P.L. 1788.
Unguentum Hydrargyri Nitratis, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Mercury two ounces,
Nitric Acid four fluidounces,
Lard a pound,
Olive Oil eight fluidounces;
First dissolve the Mercury in the Acid; then mix the solution, while hot, with the Lard and Oil melted together.

Remarks.—The action of dilute nitric acid on mercury has been explained when treating of Hydrargyri Nitrico-oxidum; it is similar in the present case in nature, but differs in degree; thus when the nitric acid is dilute, only so much suffers decomposition as is required to convert the mercury into oxide; but when it is concentrated, then twice as much is decomposed, and we procure binoxide of mercury, which the remainder of the acid dissolves and converts into a solution of nitrate of binoxide of mercury; this is mixed with the melted lard and oil to form the Unguentum Hydrargyri Nitratis.

Medicinal Use.—Stimulant and detergent. When its strength is diminished by the addition of lard, it is a local remedy of great efficacy in eruptions and various cutaneous diseases.

UNGUENTUM HYDRARGYRI NITRATIS MITIUS.

Milder Ointment of Nitrate of Mercury.

Take of Ointment of Nitrate of Mercury an ounce,
Lard seven ounces;
Rub them together.
This ointment is to be used freshly prepared.

Medicinal Use.—As Unguentum Hydrargyri Nitratis. This is used as a dressing, and for those purposes in which the preceding preparation would be too powerful.

UNGUENTUM HYDRARGYRI NITRICO-OXIDI.

Ointment of Nitric-oxide of Mercury.

Unguentum Hydrargyri Nitrico-oxydi, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Nitric-oxide of Mercury an ounce,
White Wax two ounces,
Lard six ounces;

Add the Nitric-oxide, rubbed to the finest powder, to the Wax and Lard, melted together, and rub them together.

Medicinal Use.—This is applied in the same manner, and for similar purposes, as the preceding ointment.

UNGUENTUM IODINII COMPOSITUM.

Compound Ointment of Iodine.

Unguentum Iodinii Compositum, P.L. 1836.

Take of Iodine half a drachm,
Iodide of Potassium a drachm,
Rectified Spirit a fluidrachm,
Lard two ounces;

Add the Iodide, rubbed to the finest powder, to the Lard, and the Iodine dissolved in the Spirit; and rub them together.

Medicinal Use.—Employed in bronchocele and mesenteric diseases.

UNGUENTUM OPII.

Ointment of Opium.

Take of Opium, powdered, a scruple,
Lard an ounce;
Rub them together.

Medicinal Uses.—Anodyne. Soothing to irritable sores.

UNGUENTUM PICIS.

Ointment of Pitch.

Unguentum Basilicum Nigrum vel
Unguentum Tetrapharmacum, P.L. 1746.
Unguentum Picis Aridæ, P.L. 1809.
Unguentum Resinæ Nigræ, P.L. 1809, edit. alt.
Unguentum Picis Nigræ, P.L. 1824, P.L. 1836.

Take of Pitch,
Wax,
Resin, each eleven ounces,
Olive Oil a pint;
Melt them together, and press through a linen cloth.

Medicinal Uses.—Digestive and stimulant.

UNGUENTUM PICIS LIQUIDÆ.

Ointment of Liquid Pitch [*Tar*].

Unguentum e Pice, P.L. 1746.
Unguentum Picis, P.L. 1788.
Unguentum Picis Liquidæ, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Liquid Pitch [*Tar*],
Suet, each a pound;
Melt them together, and press through a linen cloth.

Medicinal Uses.—This ointment is employed for the removal of tetter and in tinea capitis.

Remarks.—The TAR and PITCH of the Pharmacopœia are two of the numerous products derived from the destructive distillation of wood; of these, charcoal, pyroligneous (acetic) acid, and kreasote, have already been described; besides these, many other principles have been isolated from the aqueous, tarry, and spirituous products of this operation. The spirit, *pyroxylic spirit*, is obtained by rectifying the aqueous solution; in its crude state it consists of aldehyd, acetone, methol, xylit, mesit, eblanin, and pyroxylic spirit, or *methylic alcohol*. The aqueous solution contains impure acetate of ammonia and acetic acid, and the tar is composed of kreasote, kapnomor, cedriret, picamar, pittakal, paraffin, and pitch. Besides these, other substances have been described as existing in the products of the distillation of wood, but it would be foreign to the aim of this work to describe these numerous bodies, it being uncertain whether it is to the action of one particular constituent of the tar, or to the combined influence of all, that the medicinal action of this well-known, but most complex substance is owing; I therefore refer to chemical authors for an account of these products. The tar directed to be used by the College, imported under the name of *Stockholm Tar*, is obtained by a peculiar mode of distillation from the wood of various kinds of fir and pine; it is a viscid, reddish-black liquid, of a peculiar odour, and contains several of the substances above enumerated. When distilled, it yields the solid resinous-like body *pitch*, which remains in the retort, whilst the more volatile portions distil over. Stockholm tar and pitch are readily distinguished from coal and mineral tar or pitch, and even from these substances, when procured in this country by distilling various woods, by their peculiar appearance and odour, especially when warmed. The medicinal use of tar is now confined to the external application above described, although tar-water, and the vapour of tar, were formerly much lauded as specifics in some diseases of the lungs and kidneys.

UNGUENTUM PLUMBI COMPOSITUM.

Compound Ointment of Lead.

Unguentum Plumbi Compositum, P.L. 1836.

Take of Plaster of Lead three pounds,
Olive Oil eighteen fluidounces,
Prepared Chalk six ounces,
Dilute Acetic Acid six fluidounces;

Melt the Plaster in the Oil with a slow fire; then first add the Chalk, and afterwards the Acid, stirring constantly until they are cooled.

Medicinal Use.—Employed as a dressing to indolent ulcers.

UNGUENTUM PLUMBI IODIDI.

Ointment of Iodide of Lead.

Unguentum Plumbi Iodidi, P.L. 1836.

Take of Iodide of Lead an ounce,
Lard eight ounces;
Rub them together.

Medicinal Use.—Employed in chronic enlargement of the joints.

UNGUENTUM POTASSII IODIDI.

Ointment of Iodide of Potassium.

Take of Iodide of Potassium two drachms,
Distilled Water, boiling, two fluidrachms,
Lard two ounces;
Dissolve the Iodide in the Water; then mix with the Lard.

Medicinal Uses.—In scrofulous swellings, and some diseases of the skin. This is a new preparation.

UNGUENTUM SABINÆ.

Ointment of Savine.

Ceratum Sabinæ, P.L. 1809, P.L. 1824, P.L. 1836.

Take of fresh Savine, bruised, half a pound,
White Wax three ounces,
Lard a pound;
Steep the Savine in the Lard and Wax melted together; then press out through a linen cloth.

Remarks.—SAVINE is an evergreen shrub belonging to the natural family *Coniferæ*; the tops of the shoots are the officinal portion of the plant, which contain, besides other ordinary vegetable constituents, a resin and an essential oil; the latter is limpid and colourless, of an acrid taste, terebinthine smell, and specific gravity of about 0·915; it boils at 315°, and is isomeric in constitution with oil of turpentine, its formula being $C^{10}\,H^{8}$.

Medicinal Use.—Of the ointment, as an excitant where Ceratum Cantharidis produces too much irritation. Savine and its essential oil are emmenagogue; the fresh plant is too frequently employed by the peasantry as an abortifacient, but cannot be employed for this purpose without seriously endangering the life of the mother.

UNGUENTUM SAMBUCI.

Ointment of the Elder [*Flower*].

Unguentum Sambucinum, P.L. 1721, P.L. 1746.
Unguentum Sambuci, P.L. 1788, P.L. 1809, P.L. 1824, P.L. 1836.

Take of the Elder [*Flowers*],
Lard, each a pound;
Boil the Elder [flowers] with the Lard until they become crisp; then press through a linen cloth.

Medicinal Use.—This is employed for the same purposes as the Unguentum Cetacei, over which it possesses no advantage but a pleasant smell.

UNGUENTUM SULPHURIS.

Ointment of Sulphur.

Unguentum e Sulphure, P.L. 1746.
Unguentum Sulphuris, P.L. 1788, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Sulphur half a pound,
Lard a pound;
Rub them together.

UNGUENTUM SULPHURIS COMPOSITUM.

Compound Ointment of Sulphur.

Unguentum Sulphuris Compositum, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Sulphur four ounces,
Veratrum [*White Hellebore*], powdered, ten drachms,
Nitrate of Potash, powdered, two scruples,
Soft Soap four ounces,
Lard a pound;
Rub them together.

Medicinal Use.—This and the former ointment are used for the cure of the itch; the compound ointment sometimes excites too much irritation.

UNGUENTUM SULPHURIS IODIDI.

Ointment of Iodide of Sulphur.

Take of Iodide of Sulphur, powdered, half a drachm,
Lard an ounce;
Rub them together.

Medicinal Use.—This ointment is now inserted for the first time in the Pharmacopœia. It is used in cutaneous diseases of long standing, and should always be freshly prepared.

UNGUENTUM ZINCI.

Ointment of Zinc.

Unguentum Zinci, P.L. 1809, P.L. 1824, P.L. 1836.

Take of Oxide of Zinc an ounce,
Lard six ounces;
Mix.

Medicinal Use.—This may be considered as an improvement upon the Ceratum Calaminæ. It is recommended as being very useful in some species of ophthalmia, smeared upon the tarsi every night.

AN APPENDIX,

Comprising certain other substances which we have directed to be used to ascertain the genuineness of medicines.

Remarks.—In this section I shall chiefly confine my observations to the methods of preparing, and the principal uses of the tests ordered by the College, excepting in the case of Nitrate of Silver, which is also inserted in Materia Medica, and therefore requires a fuller description.

ACIDUM HYDROSULPHURICUM, *recens præparatum.*

Freshly prepared Hydrosulphuric Acid.

Remarks.—Hydrosulphuric Acid, whether as gas, or in solution in water, is best prepared by acting on sulphuret of iron with dilute sulphuric acid, when this gas is evolved in a state of sufficient purity to be used as a test; if passed into *cold* water a large portion is dissolved, and the solution smells like rotten eggs. By the action of air and light it is gradually decomposed. It is composed of one eq. of sulphur 16, and one eq. of hydrogen 1; its equivalent number is consequently 17, and its formula HS. It is a most poisonous gas.

Sulphuret of iron may be made by igniting *wrought* iron turnings nearly to whiteness in a covered crucible, throwing in about three-fifths of their weight of "roll" sulphur, and pouring the fused mixture into water to granulate it; or by rubbing an iron bar heated to whiteness, held over a pail of water, with a lump of sulphur.

Hydrosulphuric acid may also be obtained by boiling powdered tersulphuret of antimony with hydrochloric acid.

This acid, called also *sulphuretted hydrogen*, yields precipitates of the annexed colours with diluted acid or neutral solutions of the following metals:

Antimony, orange-yellow.
Bismuth, dark brown.
Cadmium, yellow.
Lead, black.
Mercury, black.
Protoxide of tin, brown-black.
Arsenic, golden-yellow.
Copper, black.
Gold, black-brown.
Silver, black.
Peroxide of tin, yellowish.

and with most neutral, and all alkaline solutions of zinc, dirty-white.

Pharmacopœia Uses.—Hydrosulphuric acid is chiefly employed to detect metallic impurity in various preparations; as described in the Notes to *Acetum*, *Acidum Aceticum*, *Acidum Sulphuricum*, *Ammoniæ Liquor*, &c.; sometimes as a characteristic test, as with *Acidum Arseniosum*, *Zinci Chloridi*; and again to ascertain whether the preparation has been properly made, as in *Antimonii Potassio-tartras*.

AMMONIÆ OXALAS, *Crystalli.*

Crystals of Oxalate of Ammonia.

Remarks.—Oxalic Acid is obtained by acting upon starch or sugar with nitric acid, and crystallizing the solution. It also frequently occurs in nature combined with potash or lime. Oxalic acid crystallizes in quadrilateral prisms containing three eqs. of water, the formula of which is $C^2 O^3$, 3HO, and the equivalent 63.

Process.—Dissolve an ounce of Oxalic Acid in half a pint of warm distilled Water, add to it sufficient Sesquicarbonate of Ammonia to exactly neutralize the solution, this will be about an ounce of the salt; then crystallize.

Oxalate of Ammonia is chiefly employed to detect lime in very dilute solutions. If a solution tested with hydrosulphuric acid yield no precipitate when either acid, neutral or alkaline; none with lime-water, ammonia, nor with dilute sulphuric acid, and yet when largely diluted, neutral, and mixed with hydrochlorate of ammonia, affords a copious precipitate with oxalate of ammonia, it contains lime.

Pharmacopœia Use.—See Materia Medica: *Aqua destillata.*

ARGENTUM.

Silver.

ARGENTI NITRAS, *Crystalli.*

Crystals of Nitrate of Silver.

Silver occurs both native and mineralized principally as a sulphuret; it is found but sparingly in this country, excepting in very minute quantities associated with lead-ore, from which it is economically separated on the large scale.

Silver is the whitest of the metals, it crystallizes in regular octohedrons, its specific gravity varies from 10·47 to 10·60. It fuses at a bright red heat about 1870°; it is not oxidized by air nor by water at any temperature; it boils and volatilizes at a white heat, but cannot be distilled; it burns with a green flame. It forms three combinations with oxygen, of which that combined with nitric acid in Argenti Nitras is the only one of importance. The characteristic test of silver is the curd-like precipitates the soluble chlorides or hydrochloric acid give with its solutions; this at first is white, but when exposed to light gradually assumes a purple hue; the white precipitate is entirely soluble in ammonia. The equivalent of silver is 108, and its symbol or formula Ag.

Pharmacopœia Use.—When in very thin sheets, *silver-leaf*, it is employed by the College to detect the presence of nitric acid in acetic acid. See MATERIA MEDICA: *Acidum Aceticum.* If exposed to any gas, or to atmospheric air containing hydrosulphuric acid gas, silver rapidly tarnishes, becoming first brown then black.

ARGENTI NITRAS, P.L. 1836.

Nitrate of Silver.

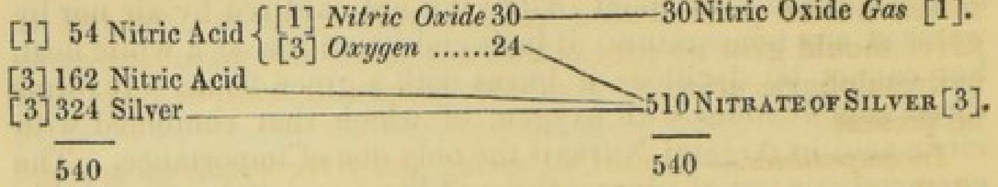
Causticum Lunare, P.L. 1721, P.L. 1746.
Argentum Nitratum, P.L. 1788.
Argenti Nitras, P.L. 1809, P.L. 1824.

Take of Silver an ounce and a half,
Nitric Acid a fluidounce and three fluidrachms,
Distilled Water two fluidounces;

Mix the Nitric Acid with the Water, and dissolve the Silver in them in a sand-bath. Afterwards increase the heat gradually, that the Nitrate of Silver may be dried. Melt this in a crucible with a slow fire, until, the Water being expelled, ebullition has ceased; then immediately pour it into proper moulds.

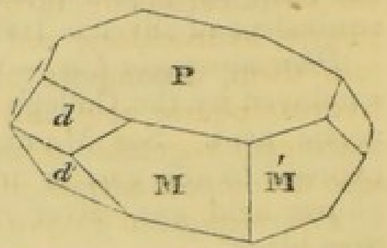
Remarks.—As thus prepared it is used as a caustic; by dissolving this nitrate of silver in distilled water it may be obtained in *crystals* as directed by the College in this section.

Process.—The action of the nitric acid on the silver is similar to that described in pp. 276–7. I subjoin a diagram of the process.



Properties.—Solution of Nitrate of Silver is colourless, and readily yields transparent colourless anhydrous crystals, the primary form of which is a *right rhombic prism*.

P on *d*	116° 36′
M on *d*	148 0
M on M′	129 31
d on *d*′	126 48



In some crystals the planes *d* are barely visible, while in others those planes encroach so much on M and M′ as to leave only minute portions of them discernible.

Its taste is strongly metallic and bitter. Water, at the temperature of 60°, dissolves its own weight of this salt. It is not deliquescent. By exposure to a strong light it becomes blackish if in contact with organic or carbonaceous matter; this is owing to the reduction of a part of the silver to the metallic state. It stains the skin black. When moderately heated it readily melts. On cooling it forms a whitish mass, having a striated and crystalline structure. If subjected to a red heat it is decomposed, metallic silver being left, and nitric acid and oxygen evolved; care is therefore to be taken that the heat be not continued too long, but merely to dissipate any water and excess of acid that may have remained after the application of the gentler heat first employed.

Composition.—Nitrate of silver is composed of

One equivalent of Oxide of Silver	116	or 68·24
One ,, of Nitric Acid	54	,, 31·76
Equivalent	170.	100·

Formula...... AgO, NO^5.

Impurities, Adulterations, and Tests.—The sticks of nitrate of silver should be nearly or quite colourless, though they are sometimes coloured by acting upon the paper in which they are enveloped. It should be totally soluble in distilled water. When fused for a caustic it is sometimes adulterated with nitrate of potash. For tests see MATERIA MEDICA: *Argenti Nitras*.

If silver containing copper be used, the nitrate is greenish by the presence of subnitrate, or blackish on account of the oxide of copper which it contains. Chloride of sodium should give a white precipitate completely soluble in excess of ammonia, which it will not do if it contain chloride of lead or of mercury. The solution after precipitation and the removal of the chloride of silver should give no precipitate, nor suffer any discoloration by hydrosulphuric acid; if it should, copper or lead, or both, may be present.

Incompatibles.—Almost all spring and river water, on account of the common salt which they usually contain; chlorides; the alkalis, potash, soda and their carbonates; lime-water. Ammonia added in excess redissolves the precipitate at first formed; the sesquicarbonate throws down carbonate of silver. The sulphuric, hydrochloric and tartaric acids, and the salts which contain them, decompose nitrate of silver. It is decomposed by hydrosulphuric acid and its salts, by the soluble sulphurets and astringent vegetable infusions. Copper and some other metals also decompose nitrate of silver, precipitating metallic silver.

Pharmacopœia Preparation of the Crystals.—Liquor Argenti Nitratis, *recens præparatus.*

Medicinal Uses.—It is the most manageable and powerful of all escharotics. Internally it is tonic and antispasmodic, and has been especially exhibited in cases of epilepsy; when it has been long taken it is sometimes deposited in the rete mucosum, so as to give a permanent dark purple hue to the patient. Dose, *one-eighth of a grain* gradually increased to *one grain.* But very much larger doses have been given. It should be made into pills with crumb of bread, and mixed with a little sugar to prevent the mass from becoming too hard.

Uses as a Test.—Chiefly, as already mentioned, to detect the presence of chlorides. With the soluble iodides it yields a yellow precipitate, with the bromides a yellowish-white, with the arsenites a yellow, and with the arseniates a brick-red precipitate.

Its *Pharmacopœia Uses* are usually to detect the presence of soluble chlorides or of hydrochloric acid, as in *Ammoniæ Liquor, Acidum Phosphoricum Dilutum, Potassæ Nitras.* It is also used to recognise phosphoric acid in *Sodæ Phosphas,* &c., and to ascertain whether *Potassii Iodidum* has been properly prepared.

AURUM.

Gold.

Gold is found *native* in most parts of the world, usually alloyed with a little silver. It is the most ductile and malleable of the metals. Its fusing-point is above that of silver; it volatilizes slightly at a very intense heat and burns with a greenish light. Its specific gravity varies from 19·4 to 19·65. Its equivalent number is 200, and its symbol or formula Au.

As a *Pharmacopœia test, Gold-leaf* is used to detect the presence of free chlorine, which dissolves it, a property possessed by no acid. See MATERIA MEDICA: *Acidum Hydrochloricum.*

BARII CHLORIDUM, *Crystalli.*

Crystals of Chloride of Barium.

Remarks.—BARIUM is the metallic base of the earth barytes, which occurs in this country usually combined with sulphuric acid, forming sulphate of barytes, which when ground is extensively used as an adulterant of white-lead, &c. This earth is met with more sparingly near Oswestry and on Alston Moor as carbonate of barytes, which is used in preparing chloride of barium. Barium is a non-volatile metal of a dark grey colour, the formula of which is Ba and its equivalent 68.

Process.—Dilute half a pint of hydrochloric acid with two pints of distilled water, then add gradually ten ounces of coarsely powdered carbonate of barytes; when the effervescence is nearly finished boil the mixture, then strain and crystallize the clear solution. Dry the crystals by exposure to air.

Remarks.—Anhydrous Chloride of Barium consists of

One equivalent of Barium	68
One „ of Chlorine	36
Equivalent.	104.

Formula. . . . . . Ba Cl.

The crystals contain two equivalents of water, consequently the equivalent is 122, and formula Ba Cl, 2HO.

Pharmacopœia Preparation.—Liquor Barii Chloridi.

Solution of Chloride of Barium is employed to detect the presence of sulphuric acid, or of the sulphates in solutions. It produces a dense white precipitate of sulphate of barytes if either be present; so delicate is this test that Pfaff states a millionth part of sulphuric acid may be detected by it. Sulphate of barytes is insoluble in every menstruum excepting hot concentrated sulphuric acid.

As a *Pharmacopœia test* it is used for the purposes just stated in *Acidum Hydrochloricum*, *Potassæ Bicarbonas*, &c., to test the absence of illegal adulteration in *Acetum*, and ascertain the genuineness of some preparations, as in *Quinæ Disulphas* and *Sodæ Sulphas.*

CUPRUM.

Copper.

The *Pharmacopœia Use* of Copper as a test is to detect silver when in solution; which metal is precipitated upon the bright strip of copper as a silvery white powder. This may be distinguished from mercury, which is deposited as a grey powder, and which when rubbed with the finger runs into globules, and leaves on the copper a brilliant amalgamated surface. See MATERIA MEDICA: *Argenti Nitras.*

CURCUMA.

Turmeric.

TURMERIC is the rhizoma of a plant belonging to the natural family *Zingiberaceæ*; its colouring principle may be obtained by exhausting the alcoholic extract with ether, and is called *curcumin.* Turmeric is an aromatic and is sometimes used as a spice; it is also employed to detect the alkalescence of any solution, which it does by changing from a yellow to a reddish-brown; there are one or two unimportant exceptions to this rule. This test is most conveniently employed by using paper stained of a light golden yellow colour by a spirituous solution of the bruised root, and cutting this stained paper into strips, one of which when dipped into the solution will become reddish-brown if the solution be alkaline, which colour it retains when dipped into distilled water.

Uses as a Pharmacopœia Test.—As above described, in *Sodæ Bicarbonas, Sodæ Carbonas,* &c.

ICHTHYOCOLLA.

Isinglass [*Gelatin*].

ISINGLASS is the dried air-vessel of a description of sturgeon. This substance is principally imported from Russia. Good isinglass is white or slightly yellowish, tasteless, inodorous and completely soluble in hot water, forming a strong jelly when cooled; its solution is a very delicate test of the existence of tannic acid in any vegetable infusion, with which it forms a flocculent precipitate; it also serves to distinguish tannic from gallic acid. It is used for the latter purpose in the Pharmacopœia. See MATERIA MEDICA: *Acidum Gallicum* and *Acidum Tannicum.*

LACMUS.

Litmus.

Litmus is procured from various lichens, of which the *Rocella Tinctoria* is preferred. The colouring matter of these lichens appears to be formed by the oxidation of several colourless principles under the joint influence of ammonia and atmospheric oxygen; for descriptions of which I must refer to chemical authors.

Litmus is employed to detect the presence of acid in a solution, for which purpose it is a most delicate test, the colour changing to a bright red. *Litmus-paper* is made and used in the same way as turmeric-paper, before described. Reddened litmus-paper is a very useful form of this test; this is made by adding just so much of a dilute acid to a solution of litmus as to deprive it of its blue tint and change it to a lilac colour; paper stained with this when dipped into a neutral solution does not change colour, but if the solution be alkaline it resumes its blue colour, if acid it turns red.

Pharmacopœia Uses.—As above described. See *Chloroformyl*, *Spiritus Ætheris Nitrici*, &c.

LIQUOR ARGENTI NITRATIS, *recens præparatus.*

Freshly prepared Solution of Nitrate of Silver.

Take of Crystals of Nitrate of Silver a drachm,
Distilled Water a fluidounce;
Dissolve and strain.

Remarks.—If both the nitrate and water be pure, the former will dissolve perfectly in the water and the filtration be unnecessary.

For *Pharmacopœia Uses*, see above, Argenti Nitras.

LIQUOR BARII CHLORIDI.

Solution of Chloride of Barium.

Take of Chloride of Barium a drachm,
Distilled Water a fluidounce;
Dissolve and strain.

Remarks.—The uses of Chloride of Barium as a test have already been described. This solution is employed in ascertaining the genuineness of vinegar. See MATERIA MEDICA : *Acetum.*

LIQUOR CHLORINII, *recens præparatus.*

Freshly prepared Solution of Chlorine.

Take of Hydrochloric Acid a fluidounce,
Binoxide of Manganese, powdered, two drachms,
Distilled Water half a pint;

Mix the Acid and Binoxide in a retort; then pass the Chlorine into the Water, until it almost ceases to be evolved.

Remarks.—For an account of the properties, &c. of Chlorine and of the decomposition in this process, see LIQUOR SODÆ CHLORINATÆ.

The *Pharmacopœia Uses* of this solution are to recognize and distinguish the alkaloids Morphia and Quina, and their salts. See MATERIA MEDICA : *Morphiæ Acetas, Quinæ Disulphas.*

LIQUOR INDIGO SULPHATIS.

Solution of Sulphate of Indigo.

INDIGO is imported from the East Indies, Guatemala, Caraccas, &c., and is the produce of various species belonging to the natural family *Leguminosæ.* Its composition is very complex; like many other vegetable colouring matters, the blue of indigo is derived from the oxidation of a colourless principle which is soluble in water.

When powdered Indigo is mixed with sulphuric acid it forms a liquid mass, which when treated with water and the solution strained, affords a deep blue liquid.

The *Pharmacopœia Use* of this solution is to detect the presence either of free chlorine, or of the unstable compounds of this gas, as in *Acidum Hydrochloricum,* and in ascertaining the goodness of Liquor Sodæ Chlorinatæ. A standard solution of sulphate of indigo is often employed to ascertain the commercial value of *Calx chlorinata.*

PLATINI BICHLORIDUM.

Bichloride of Platinum.

Platinum is found native, but always alloyed with other metals. Its colour is greyish-white: it is very malleable and ductile, and infusible at any heat but that obtained in an ignited jet of the mixed gases, oxygen and hydrogen. Its specific gravity varies from 21 to 22. It is unaltered by air or by moisture at any temperature. It is not acted upon by the pure acids, but is dissolved by *aqua-regia*; which is made by mixing about eight parts of hydrochloric acid with five parts of nitric acid; when platinum is digested in this mixture, with the assistance of heat, it is gradually dissolved by the chlorine gas evolved from the aqua-regia, and a solution of bichloride of platinum is obtained, consisting of

One equivalent of Platinum	99
Two ,, of Chlorine	$36 \times 2 = 72$
Equivalent	171

Formula...... $Pt\,Cl^2$.

Uses as a Test.—An alcoholic solution of this salt is used to detect the presence of potash. Ascertain by hydrosulphate of ammonia, oxalate of ammonia, lime-water and dilute sulphuric acid, that the solution under examination is free from all inorganic salts, excepting those of soda, lithia or potash, and if not, remove them by the proper reagents, and evaporate the solution to dryness; then gently ignite the residue to expel any ammoniacal salt, dissolve it in the least possible quantity of water, and add to this solution the alcoholic solution of the platinum salt, if potash be present a yellow precipitate is produced.

Pharmacopœia Use.—As above described. See *Liquor Sodæ*, and Materia Medica: *Sodæ Bicarbonas*, &c.

POTASSII ET HYDRARGYRI IODO-CYANIDUM.

Iodo-cyanide of Potassium and Mercury.

This is one of the numerous double salts formed by iodide of potassium. When a concentrated solution of bicyanide of mercury is added to a strong solution of iodide of potassium, beautiful brilliant micaceous scales are deposited of the iodo-cyanide of potassium and mercury. It is soluble in 16 parts of cold water.

Its *Pharmacopœia Use* as a test is to recognize the presence of any other acid in a solution of hydrocyanic acid, which it effects by this salt reddening with any acid excepting the hydrocyanic. S ee p. 56, *Acidum Hydrocyanicum Dilutum.*

STANNI PROTOCHLORIDUM.

Protochloride of Tin.

Tin occurs in this country, especially in Cornwall, mineralized by oxygen, forming *stream-tin*; this ore is often met with crystallized in octohedrons variously modified. Tin is a very fusible metal, melting at 442°; it is scarcely acted on by exposure to air and moisture at common temperatures, but when fused combines with atmospheric oxygen; at very high temperatures it ignites. It is very malleable, of a white colour, and specific gravity of about 7·2. When the fused metal is poured into water, and an excess of the granulated tin digested with heat in hydrochloric acid, hydrogen gas of a very offensive odour is evolved and a solution of protochloride of tin results; this is composed of

One equivalent of Tin	59
One ,, of Chlorine	36
	—
Equivalent......	95

Formula....... $SnCl$.

Uses as a Pharmacopœia Test.—When dropped into a solution containing gold, a peculiar purple tint is produced. This property is made available to detect free chlorine in hydrochloric acid, see Materia Medica: *Acidum Hydrochloricum*, where gold-leaf is ordered to be digested in the acid; if free chlorine exists in it some of the gold will be dissolved, and the acid so treated, tested with protochloride of tin, will yield a precipitate, or at any rate it will be discoloured. It may also be used to detect the presence of mercury in solution, and as a deoxidizing agent. It should be freshly prepared, and a little granulated tin always kept in the solution.

AN INDEX OF FORMER AND NEW NAMES.

Former Names.	New Names.
Aloe.	Aloe socotrina.
Æther sulphuricus.	Æther.
Amygdala dulcis.	Amygdala.
Antimonii sesqui-sulphuretum.	Antimonii tersulphuretum.
Aqua menthæ pulegii.	Aqua pulegii.
Bismuthi trisnitras.	Bismuthi nitras.
Carbo ligni.	Carbo.
Ceratum saponis.	Ceratum saponis compositum.
—— sabinæ.	Unguentum sabinæ.
Cinchona cordifolia.	Cinchona flava.
—— lancifolia.	—— pallida.
—— oblongifolia.	—— rubra.
Confectio piperis nigri.	Confectio piperis.
—— rosæ gallicæ.	—— rosæ.
Creasoton.	*Creasotum.*
Dauci radix.	Carota.
Diosma.	Buchu.
Decoctum cinchonæ cordifoliæ.	Decoctum cinchonæ.
—— cinchonæ lancifoliæ.	—— cinchonæ pallidæ.
—— cinchonæ oblongifoliæ.	—— cinchonæ rubræ.
Extractum aloes purificatum.	Extractum aloes.
—— cinchonæ cordifoliæ.	—— cinchonæ.
—— cinchonæ lancifoliæ.	—— cinchonæ pallidæ.
—— cinchonæ oblongifoliæ.	—— cinchonæ rubræ.
—— colocynthidis compositum.	Pilula colocynthidis composita.
—— *Opii purificatum.*	*Extractum opii.*
Guaiaci resina.	Guaiacum.
Infusum cinchonæ.	Infusum cinchonæ pallidæ.
—— diosmæ.	—— buchu.

Former Names.	New Names.
Linimentum hydrargyri compositum.	Linimentum hydrargyri.
Mentha pulegium.	Pulegium.
Menthæ pulegii oleum.	Pulegii oleum.
Pilula ipecacuanhæ composita.	Pilula ipecacuanhæ cum scillâ.
Piper cubeba.	Cubeba.
Pix nigra.	Pix.
—— *abietina.*	—— *burgundica.*
Sodæ sesquicarbonas.	Sodæ bicarbonas.
Spiritus ætheris sulphurici compositus.	*Spiritus ætheris compositus.*
Spiritus menthæ pulegii.	Spiritus pulegii.
Terebinthina vulgaris.	Terebinthina.
Tinctura balsami tolutani.	Tinctura tolutani.
—— camphoræ.	Spiritus camphoræ.
—— catechu.	Tinctura catechu composita.
Unguentum hydrargyri fortius.	Unguentum hydrargyri.
—— picis nigræ.	—— picis.

SUPPLEMENT.

A CATALOGUE

of Substances occurring in Materia Medica, and also of the Preparations omitted in the present but inserted in the Pharmacopœia of 1836, and of those inserted in the present but not occurring in that Pharmacopœia.

OMISSIONS.

Materia Medica.

Abietis Resina.
Acetosella.
Acorus.
Allium.
Althææ Folia.
Amygdala amara.
Asarum.
Aspidium.
Aurantium.
Aurantii Flores.
—— Oleum.
Barytæ Carbonas.
Bergamii Oleum.
Brominium.
Calamina.
Calcis Hydras.
Cardamine.
Centaurium.
Conii Fructus.
Contrajerva.
Creta.
Dauci Fructus.
Digitalis Semina.
Euphorbium.
Ferri Percyanidum.
Hyoscyami Semina.
Juniperi Cacumina.
Lactucarium.
Lavandula.

INSERTIONS.

Materia Medica.

Acidum Gallicum.
—— Tannicum.
Aloe Barbadensis.
—— hepatica.
Anethi Oleum.
Atropia.
Copaibæ Oleum.
Cupri Sulphas venalis.
Ferri Sulphas venalis.
Fœniculi Oleum.
Granati Radix.
Morrhuæ Oleum.
Myristicæ Oleum, *e semine expressum.*
Panis.
Rutæ Oleum.
Sabinæ Oleum.
Silex contritus.
Sulphur præcipitatum.
Thus.
Viola.

Preparations.

Chloroformyl.
Liquor Ammoniæ Citratis.
Atropiæ Sulphas.
Liquor Morphiæ Acetatis.
—— —— Hydrochloratis.

OMISSIONS.

Materia Medica.

Lauri Folia.
Limones.
Malva.
Marmor.
Marrubium.
Menyanthes.
Myristicæ Oleum *è nucleis destillatum.*
Olibanum.
Opopanax.
Origanum.
Plumbi Carbonas.
Porrum.
Quina.
Rosmarinus.
Rumex.
Sabadilla.
Simaruba.
Sodæ Acetas.
—— Carbonas impura.
Spigelia.
Stannum.
Succinum.
Terebinthina Canadensis.
Testæ.
Toxicodendron.
Tussilago.

Preparations.

Aconitina.
Morphia.
Carbo Animalis purificatus.
Testæ Præparatæ.
Aqua Fœniculi.
Decoctum Malvæ compositum.
—— Veratri.

INSERTIONS.

Preparations.

Cataplasma Carbonis.
—— Sodæ Chlorinatæ.
Decoctum Gallæ.
—— Granati Radix.
—— Hæmatoxyli.
—— Pareiræ.
—— Taraxaci.
Emplastrum Cumini.
—— Ferri.
—— Potassii Iodidi.
Enema Assafœtidæ.
Extractum Aloes Barbadensis.
—— Nucis-vomicæ.
Infusum Cinchonæ.
—— —— spissatum.
—— —— Pallidæ spissatum.
Linimentum Calcis.
Liquor Arsenici Chloridi.
Syrupus Ferri Iodidi.
Ferri Carbonas cum Saccharo.
—— Ammonio-citras.
Vinum Ferri.
Liquor Sodæ.
Zinci Chloridum.
Pilula Aloes cum Sapone.
Sulphuris Iodidum.
Syrupus Cocci.
—— Violæ.
Tinctura Aconiti.
—— Belladonnæ.
—— Cinchonæ Pallidæ.
—— Ergotæ Ætherea.
—— Limonum.
—— Lobeliæ.
—— —— Ætherea.
—— Quinæ composita.
Ammoniacum præparatum.

OMISSIONS.

Preparations.

Emplastrum Ceræ.
Extractum Digitalis.
Infusum Pareiræ.
—— Scoparii.
—— Simarubæ.
Argenti Cyanidum.
Liquor Calcii Chloridi.
Ferri Iodidum.
Hydrargyri Oxydum.
—— Binoxydum.
—— Biniodidum.
—— Bicyanidum.
—— Sulphuretum cum Sulphure.
Plumbi Chloridum.
—— Oxydum hydratum.
Liquor Potassæ effervescens.
Potassæ Bisulphas.
Potassii Bromidum.
Liquor Sodæ effervescens.
Mistura Assafœtidæ.
—— Cascarillæ composita.
—— Moschi.
Oleum Origani.
—— Succini.
—— Terebinthinæ purificatum.
Pilulæ Hydrargyri Iodidi.
—— Sagapeni compositæ.
Alcohol.
Spiritus Ammoniæ.
—— Lavandulæ.
Tinctura Camphoræ.
—— Cardamomi.
—— Guaiaci.
Unguentum Hydrargyri mitius.
—— Hydrargyri Biniodidi.
—— Veratri.

INSERTIONS.

Preparations.

Assafœtida præparata.
Cassia ——.
Galbanum præparatum.
Pix Burgundica præparata.
Prunum præparatum.
Sagapenum ——.
Styrax præparata.
Tamarindus præparatus.
Thus præparatum.
Unguentum Belladonnæ.
—— Conii.
—— Hydrargyri Nitratis mitius.
—— Opii.
—— Potassii Iodidi.
—— Sulphuris Iodidi.
Acidum Hydrosulphuricum, *recens præparatum.*
Ammoniæ Oxalas, *Crystalli.*
Aurum.
Cuprum.
Ichthyocolla.
Liquor Chlorinii, *recens præparatus.*
—— Indigo Sulphatis.
Platini Bichloridum.
Potassii et Hydrargyri Iodocyanidum.
Stanni Protochloridum.

EXPLANATION OF THE MODE OF EMPLOYING SYMBOLS AND FORMULÆ.

The term "Symbol" is advantageously made use of in a confined sense, as expressing the sign or abbreviation of an Element only; the word "Formula" being employed when it is desired to describe in symbols the constitution of a Compound body.

"Symbol or Formula" is a phrase which at times occurs in this work when treating of an element, to show the convertibility of these terms, and that they may express a precisely similar meaning.

A capital letter, as C for *carbon*, or a capital followed by a small letter, as Ca for *calcium*, denotes one equivalent of an elementary body, or of any compound body which is considered as acting the part of an element, as Cy for *cyanogen*, &c.

A capital letter followed by another without any stop, expresses a compound of one equivalent of each element, represented by those letters: thus C is *carbon*, and O is *oxygen*, both elements, and CO means one eq. of carbon, combined with one eq. of oxygen, or *oxide of carbon*.

Many binary compounds contain one eq. of one element, and more than one of the other: this happens with respect to the compounds of carbon and oxygen; thus while CO, as already mentioned, is a compound of one eq. of carbon and one eq. of oxygen, in carbonic acid, which is composed of one eq. of carbon, and two eqs. of oxygen, the number of eqs. of oxygen is represented by placing a small raised figure to the right hand of its symbol, thus, O^2; CO^2 then is *carbonic acid*, composed of one eq. of *carbon* and two eqs. of *oxygen*; *oxalic acid* is another compound of carbon and oxygen; this consists of two eqs. of *carbon*, and three eqs. of *oxygen*, and is represented by C^2O^3.

More than one equivalent of that element only, which is represented by the first letter or symbol, may enter into a compound. In this case the same rule is followed: thus, CuO a compound of one eq. of *copper*, and one eq. of *oxygen*, is *oxide of copper*; but Cu^2O is a compound of two eqs. of *copper*, and one eq. of *oxygen*, forming *dinoxide of copper*, whereas CuO^2 would represent *binoxide of copper*, if such a compound were to be discovered.

S represents one eq. of *sulphur*, but *sulphuric acid*, being a compound of one eq. of *sulphur* and three eqs. of *oxygen*, is represented by SO^3; to express *sulphate of oxide of copper*, usually called sulphate of copper, we write CuO, SO^3, merely placing a comma between the two binary compounds; but *crystallized sulphate of copper* (or blue vitriol) contains five eqs. of water; now *water* is composed of one eq. of *hydrogen* H, and one eq. of *oxygen* O, and is written HO; but this being a compound body, the number of equivalents, instead of being expressed by small raised figures on the right of each symbol, thus, H^5O^5, is designated by a large figure on the left of the compound symbol or formula, thus, 5HO.

It also happens that different oxides, salts, and numbers of equivalents of each of these also unite; thus *oxide of iron* is FeO, *sesquioxide* is Fe^2O^3, and $Fe^2O^3, 3SO^3$ is *sesquisulphate of iron*. The black or magnetic oxide of iron consists of one eq. of *oxide*, and two eqs. of *sesquioxide*, this compound is expressed by FeO, Fe^2O^3; whilst *ferric acid*, which consists of one eq. of *iron* and three eqs. of *oxygen*, is represented by FeO^3.

Again, Potassio-tartrate of Antimony consists of one eq. of *tartrate of antimony*, one eq. of *tartrate of potash*, and three eqs. of *water*; and the formula of this double salt is symbolically written with a semicolon after each simple salt, thus:

$$SbO^3, C^4H^2O^5; KO, C^4H^2O^5; 3HO,$$

whilst the bitartrate of potash used in its preparation, and consisting of one eq. of *potash*, two eqs. of *tartaric acid*, and one eq. of *water*, is written

$$KO, 2C^4H^2O^5; HO.$$

If two or more eqs. of a base are combined with only one eq. of an acid, it is advisable to reverse the usual order, and for the formula of the acid to precede that of the base, as in *diphosphate of soda*, the formula of which is written

$$PO^5, 2NaO, 25HO;$$

but where more than one eq. both of acid and of base occurs, this transposition need not be had recourse to, as no misconception can arise as to the constitution of the *carbonate of zinc* expressed by the formula

$$5ZnO, 2CO^2, 4HO.$$

Symbols expressive of compound bodies, when such bodies, like *cyanogen*, act as elements, are not objectionable, thus,

$$Cy \text{ instead of } NC^2;$$

but although in such cases the symbol is usually employed instead of the formula, a practice I have followed in this work, yet the latter in many cases is preferable, as it describes at a glance its constitution, one eq. of *nitrogen* and two eqs. of *carbon*, which cannot be gathered from the symbol Cy.

Note.—By referring to the following Tables of Formulæ and Equivalents, the method and utility of employing symbols to express the constitution of any compound body by formulæ will be evident. Thus $C^4 H^3O^3$ not only expresses anhydrous acetic acid, but it also points out that this acid is composed of 4 eqs. of carbon, 3 eqs. of hydrogen, and 3 eqs. of oxygen; and when the equivalents of these elements are multiplied by the figures attached to each symbol respectively in the Table of Elements, &c., the sum will amount to 51, which number is the equivalent or combining weight of anhydrous acetic acid.

The equivalent of a sesquisalt or compound is always one-half of the sum of the equivalents of its formula; thus the formula of sesquicarbonate of ammonia is $2NH^3 = 34$, $+ 3CO^2 = 66$, $+ 2HO = 18$, or 118; but its equivalent is $118 \div 2$, or 59. Again, sesquioxide of iron is written $Fe^2 O^3 = 80$, but its equivalent is 40, or one-half the equivalent deducible from its formula.

A TABLE

OF

ELEMENTS AND SYMBOLS,

WITH

THEIR EQUIVALENT NUMBERS.

Aluminium	Al	14
Antimony	Sb (Stibium)	129
Arsenic	As	75
Barium	Ba	68
Bismuth	Bi	213
Boron	B	11
Bromine	Br	78
Cadmium	Cd	56
Calcium	Ca	20
Carbon	C	6
Cerium	Ce	46
Chlorine	Cl	36
Chromium	Cr	28
Cobalt	Co	30
Columbium	Ta (Tantalum)	185
Copper	Cu (Cuprum)	32
Didydium	D	
Erbium	E	
Fluorine	F	19
Glucinium	G	27
Gold	Au (Aurum)	200
Hydrogen	H	1
Iodine	I	126
Iridium	Ir	99
Iron	Fe (Ferrum)	28
Lanthanum	La	54(?)
Lead	Pb (Plumbum)	104
Lithium	L	7
Magnesium	Mg	12
Manganese	Mn	28
Mercury	Hg (Hydrargyrum)	200
Molybdenum	Mo	48
Nickel	Ni	30
Niobium	Nb	102
Nitrogen	N	14
Norium	No	
Osmium	Os	100
Oxygen	O	8
Palladium	Pd	53
Pelopium	Pe	
Phosphorus	P	32
Platinum	Pt	99
Potassium	K (Kalium)	40
Rhodium	R	52
Ruthenium	Ru	52
Selenium	Se	40
Silicium or Silicon	Si	15
Silver	Ag (Argentum)	108
Sodium	Na (Natrium)	24
Strontium	Sr	44
Sulphur	S	16
Tellurium	Te	64
Thorium	Th	60
Tin	Sn (Stannum)	59
Titanium	Ti	24
Tungsten	W (Wolfram)	100
Uranium	U	60
Vanadium	V	68
Yttrium	Y	32
Zinc	Zn	32
Zirconium	Zr	22

A TABLE

OF

FORMULÆ AND EQUIVALENTS.

Acid, Acetic (anhydrous)	$C^4 H^3 O^3$	51
——, —— (glacial)	$C^4 H^3 O^3, HO$	60
——, Antimonic	SbO^5	169
——, Arsenious	AsO^3	99
——, Arsenic	AsO^5	115
——, Benzoic (anhydrous)	$C^{14} H^5 O^3$	113
——, —— (crystallized)	$C^{14} H^5 O^3, HO$	122
——, Boracic (anhdrous)	BO^3	35
——, —— (crystallized)	$BO^3, 3HO$	62
——, Bromic	BrO^5	118
——, Carbonic	CO^2	22
——, Chloric	ClO^5	76
——, Citric (anhydrous)	$C^{12} H^5 O^{11}$	165
——, —— (crystallized	$C^{12} H^5 O^{11}, 4HO$	201
——, Gallic (anhydrous)	$C^7 H^3 O^5$	85
——, —— (crystallized)	$C^7 H^3 O^5, HO$	94
——, Hydriodic	HI	127
——, Hydrobromic	HBr	79
——, Hydrochloric	HCl	37
——, Hydrocyanic (anhydrous)	HNC^2, or HCy	27
——, Hydrofluoric	HF	20
——, Hydrosulphuric	HS	17
——, Hydrosulphocyanic	$HCyS^2$	59
——, Hyponitrous	NO^3	38
——, Hypochlorous	ClO	44
——, Iodic	IO^5	166
——, Kinic (crystallized)	$C^7 H^5 O^5, HO$	96

Acid, Lactic (crystallized)	$C^6 H^5 O^5, HO$	90
——, Meconic (crystallized)	$C^{14} H O^{11}, 9HO$	254
——, Nitric (anhydrous)	NO^5	54
——, —— (sesquihydrate) sp. gr. 1·5	$2NO^5, 3HO$	67·5
——, Nitrous	NO^4	46
——, Oxalic (anhydrous)	$C^2 O^3$	36
——, —— (crystallized)	$C^2 O^3, 3HO$	63
——, Perchloric	ClO^7	92
——, Phosphoric	PO^5	72
——, Phosphorous	PO^3	56
——, Silicic	SiO^2	31
——, Succinic (anhydrous)	$C^4 H^2 O^3$	50
——, —— (crystallized)	$C^4 H^2 O^3, HO$	59
——, Sulphovinic	$C^4 H^5 O, 2SO^3, 3HO$	126
——, Sulphuric (anhydrous)	SO^3	40
——, —— (liquid) sp. gr. 1·845	SO^3, HO	49
——, Sulphurous	SO^2	32
——, Tannic	$C^{18} H^8 O^{12}$	212
——, Tartaric (anhydrous)	$C^4 H^2 O^5$	66
——, —— (crystallized)	$C^4 H^2 O^5, HO$	75
——, Uric (crystallized)	$C^{10} H^2 N^4 O^4, 2HO$	168
Alcohol	$C^4 H^5 O, HO$	46
Alum, Potash (crystallized)	$Al^2 O^3, 3SO^3;\ KO, SO^3;\ 24HO$	476
Alumina	$Al^2 O^3$	52
Ammonia	NH^3	17
——, Acetate	$NH^3, C^4 H^3 O^3$	68
——, Bicarbonate (hydrated)	$NH^3, 2CO^2, 2HO$	79
——, Carbonate	NH^3, CO^2	39
——, Sesquicarbonate (hydrated)	$2NH^3, 3CO^2, 2HO$	59
——, Hydrochlorate	NH^3, HCl	54
——, Nitrate	NH^3, NO^5, HO	80
——, Sulphate	$NH^3, SO^3, 2HO$	75
Antimony, Potassio-tartrate	$SbO^3,\ C^4 H^2 O^5;\ KO,\ C^4 H^2 O^5;\ 3HO$	360
——, Teroxide	SbO^3	153
——, Tersulphuret	SbS^3	177
Atropia	$C^{34} H^{23} N O^6$	289
Barium, Chloride (crystallized)	$BaCl, 2HO$	122
Barytes	BaO	76

Barytes, Carbonate	BaO, CO^{2}	98
——, Nitrate	BaO, NO^{5}	130
——, Sulphate	BaO, SO^{3}	116
Bismuth, Oxide	BiO^{3}	237
——, Nitrate	BiO^{3}, NO^{5}	291
Calcium, Chloride	$CaCl$	56
——, Oxide (See Lime).		
Chloroform	$C^{2} H Cl^{3}$	121
Cinchonia	$C^{20} H^{12} N O$	154
Conia	$C^{17} H^{17} N$	133
Copper, Acetate	$CuO, C^{4} H^{3} O^{3}, HO$	100
——, Diacetate	$C^{4} H^{3} O^{3}, 2CuO, 6HO$	185
——, Dinoxide	$Cu^{2} O$	72
——, Oxide	CuO	40
——, Sulphate (crystallized)	$CuO, SO^{3}, 5HO$	125
Cyanogen	NC^{2} or Cy	26
Ethyl	$C^{4} H^{5}$	29
——, Oxide (Ether)	$C^{4} H^{5} O$	37
——, Hyponitrite of (Hyponitrous Ether)	$C^{4} H^{5} O, NO^{3}$	75
Ethereal Oil	$C^{8} H^{9} O, 2SO^{3}, 2C^{4} H^{4}$	201
Iron, Iodide (crystallized)	$FeI, 5HO$	199
——, Potassio-tartrate	$KO, C^{4} H^{2} O^{5}; Fe^{2} O^{3}, C^{4} H^{2} O^{5}$	260
——, Chloride	$FeCl$	64
——, Oxide	FeO	36
——, Sesquichloride	$Fe^{2} Cl^{3}$	82
——, Sesquioxide	$Fe^{2} O^{3}$	40
——, Sulphate (crystallized)	$FeO, SO^{3}, 7HO$	139
Lead, Acetate	$PbO, C^{4} H^{3} O^{3}, 3HO$	190
——, Chloride	$PbCl$	140
——, Diacetate	$C^{4} H^{3} O^{3}, 2PbO$	275
——, Iodide	PbI	230
——, Oxide	PbO	112
Lime	CaO	28
——, Carbonate	CaO, CO^{2}	50
——, Hydrate	CaO, HO	37
——, Sulphate (crystallized)	$CaO, SO^{3}, 2HO$	86
——, Tartrate	$CaO, C^{4} H^{2} O^{5}, 4HO$	130
Magnesia	MgO	20
——, Carbonate	MgO, CO^{2}	42

Magnesia, Carbonate (hydrated, P.L.)	$MgO, 2HO; 4MgO, CO^2, HO$	242
——, Sulphate	$MgO, SO^3, 7HO$	123
Manganese, Binoxide	MnO^2	44
——, Chloride	$MnCl$	64
——, Oxide	MnO	36
——, Sulphate	MnO, SO^3	76
Mercury, Bichloride	$HgCl^2$	272
——, Bicyanide	$Hg, 2Cy$	252
——, Biniodide	HgI^2	452
——, Binoxide	HgO^2	216
——, Bipersulphate	$HgO^2, 2SO^3$	296
——, Bisulphuret	HgS^2	232
——, Chloride	$HgCl$	236
——, Iodide	HgI	326
——, Oxide	HgO	208
——, Sulphate	HgO, SO^3	248
Morphia (anhydrous)	$C^{35} H^{20} N O^6$	292
—— (crystallized)	$C^{35} H^{20} N O^6, 2HO$	310
——, Acetate (crystallized)	$C^{35} H^{20} N O^6, C^4 H^3 O^3, HO$	352
——, Hydrochlorate (cryst.)	$C^{35} H^{20} N O^6, HCl, 6HO$	383
Potash (anhydrous)	KO	48
——, Acetate	$KO, C^4 H^3 O^3, HO$	108
——, Bicarbonate	$KO, 2CO^2; HO$	101
——, Bisulphate	$KO, 2SO^3, 2HO$	146
——, Bitartrate	$KO, 2C^4 H^2 O^5; HO$	189
——, Carbonate (anhydrous)	KO, CO^2	70
——, —— (sesquihydrated) P.L.	$2KO, CO^2; 3HO$	83·5
——, Hydrate	KO, HO	57
——, Nitrate	KO, NO^5	102
——, Sulphate	KO, SO^3	88
——, Tartrate	$KO, C^4 H^2 O^5$	114
Potassium, Bromide	KBr	118
——, Chloride	KCl	76
——, Ferrocyanide	$FeCy, 2KCy, 3HO$	213
——, Iodide	KI	166
Quina	$C^{20} H^{12} N O^2$	162
——, Disulphate (crystallized)	$SO^3; 2C^{20} H^{12} N O^2, 8HO$	436
Silver, Chloride	$AgCl$	144
——, Cyanide	$AgCy$	134

Silver, Nitrate	AgO, NO^5	170
——, Oxide	AgO	116
Soda	NaO	32
——, Acetate	$NaO, C^4 H^3 O^3, 6HO$	137
——, Bicarbonate	$NaO, 2CO^2; HO$	85
——, Biborate (crystallized)	$NaO, 2BO^3, 10HO$	192
——, Carbonate (anhydrous)	NaO, CO^2	54
——, —— (crystallized)	$NaO, CO^2, 10HO$	144
——, Hydrate	NaO, HO	41
——, Sulphate (anhydrous)	NaO, SO^3	72
——, —— (crystallized)	$NaO, SO^3, 10HO$	162
Sodium, Chloride	$NaCl$	60
——, Oxide (Soda)	NaO	32
Strychnia	$C^{44} H^{24} N^2 O^4$	348
Zinc, Chloride	$ZnCl$	68
——, Oxide	ZnO	40
——, Sulphate (crystallized)	$ZnO, SO^3, 7HO$	143

A TABLE,

Regulating the ordinary proportion of Doses, according to the Age of the Patient.

For an Adult	1	e.g. ʒj.
From 21 Years to 14	$\frac{2}{5}$	℈ij.
14 —— 7	$\frac{1}{2}$	ʒss.
7 —— 4	$\frac{1}{3}$	℈j.
4	$\frac{1}{4}$	gr. xv.
3	$\frac{1}{6}$	gr. x.
2	$\frac{1}{8}$	gr. viii.
1	$\frac{1}{12}$	gr. v.

A POSOLOGICAL TABLE.

Absinthium	℈j	to	ʒj.
Acacia	ʒss		ʒij.
Acetum Colchici	fʒss		fʒj.
—— Destillatum	fʒj		f℥ss.
—— Scillæ	fʒss		fʒij.
Acidum Benzoicum	gr. x		ʒss.
—— Citricum	gr. x		ʒss.
—— Gallicum	gr. ij		gr. xv.
—— Hydrochloricum	♏v		♏xx.
—— Hydrochloricum Dilutum	♏xx		fʒj.
—— Nitricum Dilutum	♏x		♏xl.

Acidum Hydrocyanicum Dilutum	♏v.	
—— Phosphoricum Dilutum	♏xx to	fʒj.
—— Sulphuricum Dilutum	♏x	♏xl.
—— Tartaricum	gr. x	ʒss.
—— Tannicum	gr. ij	gr. xv.
Aconiti Folia	gr. j	gr. v.
Æther	fʒss	fʒij.
Ærugo	gr. $\frac{1}{8}$	gr. j.
Aloes Extractum	gr. ij	gr. xv.
Alumen	gr. x	℈j.
Ammoniacum	gr. x	ʒss.
Ammoniæ Hydrochloras	gr. x	ʒss.
—— Sesquicarbonas	gr. v	℈j.
Anethi Fructus	gr. x	ʒj.
Anisi Fructus	gr. x	ʒj.
Anthemidis Flores	gr. x	ʒss.
Antimonii Oxysulphuretum	gr. j	gr. iv.
—— Potassio-tartras (Diaphoretic)	gr. $\frac{1}{4}$	gr. ss.
—— —— (Emetic)	gr. j	gr. ij.
—— Tersulphuretum	gr. x	ʒss.
Aqua Anethi	f℥j	f℥iv.
—— Carui		
—— Cinnamomi		
—— Menthæ Piperitæ		
—— —— Viridis		
—— Pimentæ		
—— Pulegii		
Argenti Nitras	gr. $\frac{1}{8}$	gr. j.
Armoraciæ Radix	℈j	ʒj.
Assafœtida	gr. x	ʒss.
Balsamum Peruvianum	gr. x	ʒss.
—— Tolutanum	gr. x	ʒss.
Belladonnæ Folia	gr. ss	gr. x.
Benzoinum	gr. x	ʒss.
Bismuthi Nitras	gr. v	gr. xv.
Cajuputi Oleum	♏j	♏v.
Calumbæ Radix	gr. x	℈j.
Cambogia	gr. ij	gr. x.

Camphora	gr. iij	to	℈j.
Canellæ Cortex	gr. x		ʒss.
Capsici Baccæ	gr. v		gr. x.
Cardamomi Semina	gr. v		ʒss.
Carui Fructus	gr. x		ʒj.
Caryophylli	gr. v		ʒss.
Cascarillæ Cortex	gr. x		ʒj.
Cassiæ Pulpa	℥ss		℥j.
Castoreum	gr. v		℈j.
Catechu	gr. x		℈ij.
Cetaceum	℈j		ʒiss.
Cinchonæ flavæ Cortex	gr. x		ʒiss.
—— pallidæ Cortex	gr. x		ʒiss.
—— rubræ Cortex	gr. x		ʒiss.
Cinnamomi Cortex	gr. v		℈j.
Colchici Cormus	gr. j		gr. v.
Confectio Aromatica	℈j		ʒj.
—— Aurantii	ʒj		℥j.
—— Cassiæ	ʒij		℥j.
—— Opii	gr. x		ʒss.
—— Piperis	ʒj		ʒij.
—— Rosæ	ʒj		℥j.
—— —— Caninæ	ʒj		℥j.
—— Scammonii	ʒss		ʒj.
—— Sennæ	ʒj		ʒiij.
Conii Folia	gr. v		℈j.
Copaiba	℈j		ʒj.
Coriandri Fructus	℈j		ʒj.
Creta Præparata	gr. x		℈ij.
Cubeba	ʒj		ʒij.
Cupri Ammonio-sulphas	gr. ¼		gr. v.
Cupri Sulphas	gr. ss		gr. ij.
—— (Emetic)	gr. ij		gr. x.
Cuspariæ Cortex	gr. x		ʒj.
Cymini Fructus	℈j		ʒj.
Decoctum Aloes Compositum	f℥ss		f℥j.
—— Cetrariæ	f℥j		f℥iv.
—— Chimaphilæ	f℥j		f℥jss.
—— Cinchonæ	f℥j		f℥iij.

Decoctum Dulcamaræ	f℥ss	to	f℥j.
—— Gallæ	f℥j		f℥ij.
—— Granati	f℥ss		f℥j.
—— Hæmatoxyli	f℥j		f℥ij.
—— Pareiræ	f℥j		f℥iij.
—— Sarsæ	f℥iv		f℥viij.
—— —— Compositum	f℥iv		f℥vj.
—— Scoparii Compositum	f℥j		f℥iss.
—— Senegæ	f℥iss		f℥iij.
—— Taraxaci	f℥j		f℥iij.
—— Tormentillæ	f℥j		f℥iss.
—— Ulmi	f℥iv		f℥vj.
—— Uvæ Ursi	f℥j		f℥ij.
Digitalis Folia	gr. ss		gr. iij.

Extractum Aconiti	gr. ss	gr. v.
—— Aloes	gr. j.	gr. x.
—— Cinchonæ	gr. x	ʒss.
—— Colchici	gr. ss	gr. ij.
—— —— Aceticum	gr. ss	gr. ij.
—— Colocynthidis	gr. v	℈j.
—— Conii	gr. v	℈j.
—— Elaterii	gr. ss	gr. ij.
—— Gentianæ	gr. x	ʒss.
—— Hæmatoxyli	gr. x	ʒss.
—— Hyoscyami	gr. v	gr. x.
—— Jalapæ	gr. x	℈j.
—— Lactucæ	gr. v	gr. x.
—— Lupuli	gr. v	℈j.
—— Opii	gr. j	gr. v.
—— Papaveris	gr. ij	℈j.
—— Pareiræ	gr. x	ʒss.
—— Rhei	gr. x	ʒss.
—— Sarsæ	℈j	ʒj.
—— Stramonii	gr. ¾	gr. ij.
—— Taraxaci	gr. x	℈j.
—— Uvæ Ursi	gr. x	℈j.

Ferri Ammonio-chloridum	gr. iij	gr. xv.
—— Ammonio-citras	gr. iij	gr. xx.

Ferri Carbonas cum Saccharo	gr. v	to	gr. xx.
—— Potassio-tartras	gr. v		gr. xx.
—— Sesquioxidum	gr. v		ʒiv.
—— Sulphas	gr. j		gr. v.
Fœniculi Fructus	℈j		ʒj.
Galbani	gr. x		ʒss.
Gentianæ Radix	gr. x		ʒj.
Granati Cortex	℈j		ʒj.
Guaiaci	gr. x		ʒss.
Hydrargyri Bichloridum	gr. $\frac{1}{8}$		gr. $\frac{1}{4}$
—— Chloridum (Alterative)	gr. ss		gr. j.
—— —— (Purgative)	gr. v.		gr. x.
—— Iodidum	gr. j		gr. iij.
Hydrargyrum cum Cretâ	gr. x		ʒss.
Hyoscyami Folia	gr. v.		gr. x.
Jalapæ Radix	gr. x		ʒss.
Infusum Anthemidis	f℥j		f℥ij
—— Armoraciæ Compositum	f℥j		f℥iss.
—— Aurantii Compositum	f℥j		f℥ij.
—— Buchu	f℥iss		f℥ij.
—— Calumbæ	f℥iss		f℥ij.
—— Caryophylli	f℥j		f℥ij.
—— Cascarillæ	f℥iss		f℥ij.
—— Catechu Compositum	f℥j		f℥iij.
—— Cinchonæ	f℥j		f℥iij.
—— —— spissatum	♏xx		f℥ss.
—— Cuspariæ	f℥iss		f℥ij.
—— Digitalis	f℥ss		f℥j.
—— Gentianæ Compositum	f℥iss		f℥ij.
—— Krameriæ	f℥iss		f℥ij.
—— Lupuli	f℥j		f℥iss.
—— Quassiæ	f℥iss		f℥ij.
—— Rhei	f℥j		f℥iij.
—— Rosæ Compositum	f℥j		f℥iss.
—— Sennæ Compositum	f℥ij		f℥iv.
—— Serpentariæ	f℥j		f℥ij.
—— Valerianæ	f℥iss		f℥ij.

Ipecacuanha (Diaphoretic)	gr. ss. to	gr. ij.
—— (Emetic)	gr. v	ʒss.
Kino	gr. x	ʒss.
Krameria	gr. x	℈j.
Lauri Fructus	gr. x	ʒss.
Liquor Ammoniæ	♏x	fʒss.
—— —— Acetatis	fʒiv	fʒvj.
—— —— Sesquicarbonatis	fʒss	fʒj.
—— —— Arsenici Chloridi	♏iij	♏xx.
—— Calcis	f℥j	f℥vj.
—— Hydrargyri Bichloridi	fʒss	fʒij.
—— Morphiæ Acetatis	♏ij	fʒj.
—— —— Hydrochloratis	♏ij	fʒj.
—— Potassæ	♏x	fʒss.
—— —— Arsenitis	♏iv	♏xv.
—— —— Carbonatis	♏x	fʒj.
—— Potassii Iodidi Compositus	fʒss	f℥ss.
Magnesia	ʒss	ʒj.
Magnesiæ Carbonas	℈j	ʒj.
—— Sulphas	℥ss	℥iss.
Manna	℥ss	℥ij.
Mastiche	gr. x	ʒss.
Mentha Piperita	gr. x	ʒj.
—— Viridis	gr. x	ʒj.
Mezerei Cortex	gr. j	gr. x.
Mistura Acaciæ	fʒj	f℥j.
—— Ammoniaci	f℥ss	f℥j.
—— Camphoræ	f℥j	f℥ij.
—— Cretæ	f℥j	f℥ij.
—— Ferri Composita	f℥j	f℥ij.
—— Gentianæ Composita	f℥i	f℥ij.
—— Guaiaci	f℥ss	f℥ij.
—— Spiritûs Vini Gallici	f℥ss	f℥iss.
Morphiæ Acetas	gr. $\frac{1}{8}$	gr. $\frac{1}{4}$.
—— Hydrochloras	gr. $\frac{1}{8}$	gr. $\frac{1}{4}$.
Moschus	gr. ij	℈j.
Myristicæ Nuclei	gr. v	gr. x.
Myrrha	gr. x	ʒj.

Oleum Anethi	♏j	to	♏v.
—— Anisi	♏j		♏v.
—— Anthemidis	♏j		♏v.
—— Carui	♏j		♏v.
—— Caryophylli	♏j		♏v.
—— Cinnamomi	♏j		♏iij.
—— Copaibæ	♏v		♏xxx.
—— Fœniculi	♏j		♏v.
—— Juniperi	♏j		♏v.
—— Lavandulæ	♏j		♏v.
—— Menthæ Piperitæ	♏j		♏iij.
—— —— Viridis	♏j		♏v.
—— —— Pulegii	♏j		♏v.
—— Morrhuæ	fʒj		f℥j.
—— Pimentæ	♏j		♏iij.
—— Ricini	fʒiv		f℥iss.
—— Rosmarini	♏ij		♏v.
—— Rutæ	♏j		♏v.
—— Sabinæ	♏j		♏vj.
—— Terebinthinæ (Diuretic)	♏x		fʒss.
—— —— (Vermifuge)	fʒij		f℥j.
Opium	gr. ss		gr. v.
Oxymel	fʒj		f℥ss.
—— Scillæ	fʒss		fʒij.

Pilula Aloes Composita	gr. x	℈j.
—— —— cum Myrrhâ	gr. x	℈j.
—— —— —— Sapone	gr. ij	gr. x.
—— Cambogiæ Composita	gr. x	℈j.
—— Colocynthidis Composita	gr. v	ʒss.
—— Conii Composita	gr. iij	gr. v.
—— Ferri Composita	gr. x	℈j.
—— Galbani Composita	gr. x	℈j.
—— Hydrargyri (Alterative)	gr. iv	gr. vj.
—— —— (Purgative)	gr. x	℈j.
—— —— Chloridi Composita	gr. v	gr. x.
—— Ipecacuanhæ cum Scillâ	gr. v	gr. x.
—— Rhei Composita	gr. x	℈j.
—— Saponis Composita	gr. iij	gr. x.
—— Scillæ Composita	gr. x	℈j.

Pilula Styracis Composita	gr. iij to	gr. x.
Pimentæ Baccæ	gr. v	℈j.
Piperis Longi Fructus	gr. v	℈j.
—— Nigri Fructus	gr. v	℈j.
Plumbi Acetas	gr. ss	gr. j.
Plumbi Iodidum	gr. ¼	gr. ½.
Potassæ Acetas	℈j	ʒj.
—— Bicarbonas	gr. x	ʒss.
—— Bitartras	ʒj	℥ss.
—— Carbonas	gr. x	ʒss.
—— Nitras	gr. x	ʒss.
—— Sulphas	gr. x	℥ss.
—— Tartras	ʒj	℥j.
Potassii Iodidum	gr. v	gr. x.
Pulvis Aloës Compositus	gr. x	℈j.
—— Antimonii Compositus	gr. v	gr. x.
—— Cinnamomi Compositus	gr. v	gr. x.
—— Cretæ Compositus	gr. v	ʒss.
—— Cretæ Compositus cum Opio	gr. v	ʒss.
—— Jalapæ Compositus	℈j	℈ij.
—— Ipecacuanhæ Compositus	gr. v	℈j.
—— Kino Compositus	gr. v	℈j.
—— Scammonii Compositus	gr. v	℈j.
—— Tragacanthæ Compositus	gr. x	ʒj.
Quassiæ Lignum	gr. v	ʒss.
Quercûs Cortex	gr. x	ʒss.
Quinæ Disulphas	gr. iij	gr. x.
Rhei Radix	gr. x	ʒss.
Rosæ Caninæ Pulpa	ʒj	℥j.
—— Centifoliæ Petala	℈j	ʒj.
—— Gallicæ Petala	℈j	ʒj.
Rutæ Folia	gr. xv	℈ij.
Sabinæ Folia	gr. x	ʒss.
Sagapenum	gr. x	ʒss.
Sapo	gr. v	ʒss.
Sarsæ Radix	℈j	ʒj.
Sassafras Lignum	℈j	ʒj.

Scammonium	gr. v	to	℈j.
Scillæ Radix Recens	gr. v		gr. xv.
—— —— Exsiccata	gr. j		gr. iij.
Senegæ Radix	℈j		℈ij.
Sennæ Folia	℈j		ʒj.
Serpentariæ Radix	gr. x		ʒss.
Sinapis Semina	ʒj		℥ss.
Sodæ Biboras	gr. x		ʒss.
—— Carbonas	gr. x		ʒss.
—— —— Exsiccata	gr. v		gr. xv.
—— Potassio-tartras	ʒij		℥j.
—— Bicarbonas	gr. x		ʒss.
—— Sulphas	℥ss		℥ij.
Spiritus Ætheris Nitrici	♏x		♏xl.
—— —— Compositus	fʒss		fʒij.
—— Ammoniæ Aromaticus	fʒss		fʒj.
—— —— Fœtidus	♏xv		fʒss.
—— Anisi	fʒij		f℥ss.
—— Armoraciæ Compositus	fʒij		f℥ss.
—— Carui	fʒij		f℥ss.
—— Cinnamomi	fʒij		f℥ss.
—— Juniperi Compositus	fʒiij		f℥j.
—— Menthæ Piperitæ	fʒij		f℥ss.
—— —— Viridis	fʒij		f℥ss.
—— Myristicæ	fʒij		f℥ss.
—— Pimentæ	fʒij		f℥ss.
—— Pulegii	fʒij		f℥ss.
Strychnia	gr. $\frac{1}{16}$		gr. $\frac{1}{8}$.
Sulphur	ʒj		ʒij.
Syrupus Ferri Iodidi	♏x		fʒj.
—— Papaveris	fʒj		f℥j.
—— Rhamni	f℥ss		f℥j.
—— Sarsæ	fʒj		f℥ss.
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The Latin names, unless dissimilar to the English, do not usually occur in this index. Thus "Acida," "Ammoniæ hydrochloras," are not inserted, but when these names materially differ they will be found in italics and with a reference, as "*Absinthium*, see Wormwood," "*Aquæ*, see Waters." The reference in chief, when more than one page is mentioned, is usually placed last, as in "Acetate of Morphia, 26, 214," respecting which the principal particulars are inserted in page 214.

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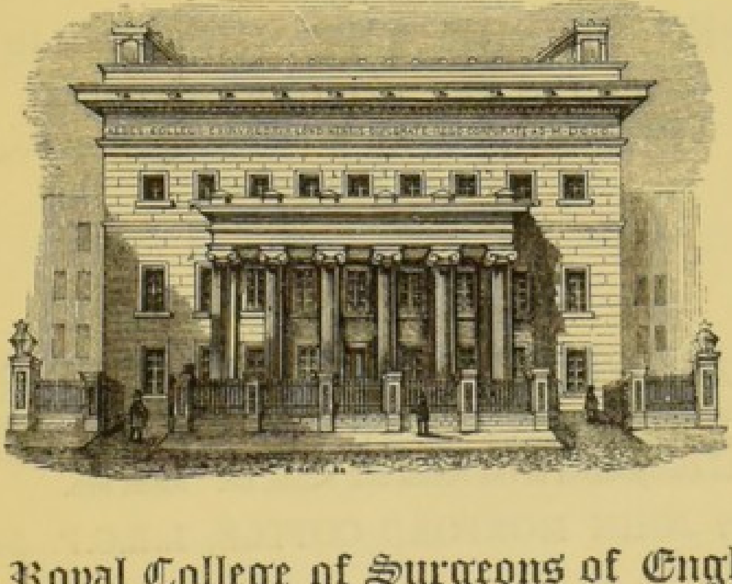

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