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Chymistry Part III

Of the Chemical History of Bodies

This last part of our Course, which is of greatest importance, has been treated by most Authors in an unsystematical and loose way. In order to bring it into a regular Form, & to point out those general Heads to which new Chymical Facts which afterwards occur may be referred we shall follow the Arrangement of Bodies formerly given in ye first Part for the reasons we then set forth. But as it is often of Consequence to know which of the three different Kingdoms of Nature Bodies belong to we shall take occasion to mention this also in going along as far as our Time will allow.—

We chuse to begin with Saline Bodies as they have more Connexion with the rest & the knowledge of them is of greater Importance than that of any of the other five Kinds.—

Of Salts in general

It will be neceſsary first to consider Salts in general before

we enter on the Chymical History of the particular Species as they have all such a Connection that in speaking of one we must neceſsarily introduce some of the rest.

Saline Bodies are { Simple
or
Compound

It may not be improper to repeat what we said in Part. First with regard to the meaning in which we use the Term simple. Simple Salts then are such as we cannot resolve into more simple Bodies & always enter as ingred^{ts} into the Composition of what is called Compound Salts but we would not have inferred from this that we think em absolutely pure elementary & unmixt bodies Tho we acknowledge that the definition formerly given of Saline

Bodies in general that they are sapid to the Taste miscible with Water and not inflammable is far from being compleat yet from our not knowing their Chemical History we are not now in a condition to make any addition to it unless perhaps that they are Fusible in the Fire.

Simple Saline Bodies are of 2 kinds viz Acid & Alkali Acid may be considered as a genus of which there are four Species viz
- Vitriolic ⊕
- Nitrous ⦶
- Marine ⊖
- Vegetable 🜊

We cannot yet give any farther Acct of these than that they are got from four different Substances from which they get their Names.

Alkali is of a higher order and may be reckoned to include two Genera fixt & Volatile Of the first there are two Species
- Vegetable
- and
- Fossile

of the second there is only one so that there are just three Species of Alkalies. ——

Compound Saline Bodies are such as appear in the Saline Form & have always a simple Salt for an Ingredt. This we said in the first part was always an acid. But there are grounds for some doubts in that Particular. ——

Compd Saline Bodies are either
{ Neutral Perfect
{ Metallic }
{ Earthy } Imperfect

It is only the first of these viz the Neutral that consists of the two simple Salts which we can here consider As we are yet unacquainted with the Metallic & Earthy Substances which may enter into the Composition of the other two. We formerly said that a Neutral Salt could only be formed by a certain determined Proportion of the two simple Salts that enter into its Composition & that only that determined Proportion of these two could be united It has however of Late been thought by a Chemist of considerable Authority that an

Acid & alkali may be united in different proportions & that according to the differences in these neutral Salts of different properties will be produced we shall afterwards take occasion to examine into this but at present let us suppose the first Opinion just in which case we shall find that there can be only 12 different Species of Neutral Salts for since there are only 4 Acids & 3 Species of Alkalies these can only be formed into 12 various combinations The different Names of these are set down in the following Table In the first Column are placed the 4 Acids Opposite to each of these the 3 Alkalies in ye 2 and in the third 4 different Setts of Neutral Salts opposite each of them The table may be diversified by placing in the first Column the 3 Alkalies Then opposed to each of them the 4 acids & thirdly 3 setts of Salts opposed to each Alkali.—

A Table of Neutral Salts

Acid	Alkali	Neutral
1 Vitriolic	1 Fixt Vegetable	1 Vitriolate Tartar
	2 Foſsile	2 Glauber's Salt
	3 Volatile	3 Vitriolic Ammon:
II Nitrous	1 Vegetable	4 Common Nitre
	2 Foſsile	5 Cubic Nitre
	3 Volatile	6 Nitrous Ammoniac
III Muriatic	1 Vegetable	7 Digestive Salt
	2 Foſsil	8 Sea Salt
	3 Volatile	9 Common Ammoniac
IV Vegetable	1 Vegetable	10 Regenerated Tartar
	2 Foſsile	11 Sal polychrest of Rochelle
	3 Volatile.	12 Sp^t Mynder. or Veg: Ammon

In the Books on Chemistry we are not to be surprized to find many other Names of Neutral Salts than what are here mentioned It is but of

Late that Chemists know that the very same Neutral Salt was often produced in different ways & according to this even differs considerably in the appearance it puts on & till they knew this it was natural to give a name to every Salt that differed from all others in the manner of procuring it For instance the Salt that goes under the name of Sal polychrest in the Shops is nothing but a vitriolate Tartar. ——

Of the Solution of Salts

Water is an universal menstruum of all Salts Wine Vinegar Cyder &c are so also but this is undoubtedly in consequence of the water they contain If any oils are capable of dissolving em tis probable that their Power also proceeds from water in them Ardent Spirits are menstrua to many Salts but I would be apt to conclude that this was owing to their Proportion of Water. For this reason that those

[illegible]

Of the Madness of [illegible]

[illegible]

Salts are all deliquescent that are soluble in ardent Spirits (unleſs the Ammoniacal) so that these Salts seem to act by attracting the watery moisture of the ardent Spirits.

2. Every two bodies that are thus united have their specific Gravity or Bulk thereby altered In wet or common Solution this is ordinarly rendered leſs Thus if we join a Cubic Inch of Water & a Cubic Inch of the Vit: Acid together Their bulk will not amount to two cubic Inches I say it is ordinarly rendered leſs but indeed I believe there are no Instances in humid Solution of the bulk becoming greater as there undoubtedly is in dry Solution.

3. In part 2d when on Solution we mentioned that Water would only diſsolve a given Quantity of Salt & that this Quantity varyed in different Salts. To Illustrate this we also told the proportions of certain Salts that could be diſsolved in a given Quantity of water. We must

now observe that tho the Chemists have employed a great deal of Pains in ascertaining these yet nothing Accurate or exact has been attained & this owing principally to 2 Reasons

1 Because Salts are not fixed in their Nature that is the same Salt is sometimes more soluble than at others Thus there is one kind of Common Salt of which Water diſsolves 1/3 of its Weight There is another of which it diſsolves 1/2 of its Weight.

2. Because of the difference in the Solubility of Salts that arises from the different degrees of Heat the Solution is performed in & the Chemists have not paid suffict. Attention to make their Experiments on different Salts in the same degree of Heat.[x] — For these reasons I shall not mention here these different Proportions but only take notice of the greater or leſs Solubility of Salts in general compared with

[illegible]

1. Vegetable Alkali
2. Ammoniacal Nitre
3. Glauber's Salt

Sal Digestivum
Common Salt
Common Ammoniac

[illegible]
[illegible]

As Water diſsolves 1/6 of Nitre in the Warmth of 53
egrees Farenheits Theom. but as the heat is increased
e Qy that may be diſsolved seems to be unlimited as
e nitre seems to undergo a kind of Fusion by the
eat as we know that altho the Menstruum is
minished by Evap. the Salt will not Chrystallize
ill the Heat is leſsened.

each other setting the most soluble uppermost.

A Table to shew the difference in the Solubility of Salts.

1--Vegetable Alkali - deliquesc^{t} when caustic
2--Regenerate Tartar deliquesc^{t}
3--Glauber's Salt In the Air calcines
4---{Sal Digestivum
Common Salt
Common Ammoniac}
5--{Common Nitre
Cubic Nitre}
6---Fossile Alkali
7--Vitriolate Tartar

There are some of the neutral Salts not mentioned in this Table because no Exper^{ts} have been made with any Accuracy upon them.

N.B. There is a third reason for our not depending on these proportions of the Salts & their Water because it vary's according to the Quantity of air contained in that Water.— For instance dissolve the full Quantity of Nitre in boiling

Water let it cool & its superfluity of Salt will be precipitated & a leſs Quantity remain suspended than if it had at first been diſsolved in cold Water & this owing to the Air's being set loose by the boiling. —

3 - When Water is saturated with one Salt it will diſsolve another & that nearly in the same proportion as if no other had been united with it This is to be understood of those Salts which do not by means of elective Attractions decompose each other This proves the difference we said there was between Mixture & Solution viz that only two bodies could at the same Time be united in Mixture. — Lemery was the 1st who taught us that when Water is saturated with one Salt suppose Nitre if we diſsolve a Quantity of Common Salt in it it will then take up a fresh Qty of Nitre. This is with difficulty to be accd for Whatever such an extraordinary Fact is owing to it is supported

x An ounce of Water diſsolves but 10 grains of Corros. Sublimate but if a Quantity of Sal ammon is added it will take up 20 times that Quantity

by many Instances Corr: Sublimate can:not be diſsolved but to the Quantity of 13 or 14 gr: in an oz: of Water but by adding some Common Ammoniac 4 times that Quantity becomes soluble.

Of the recovery of Salts from their Menstrua

1 This may be done by Precipitation that is by means of elective Attractions & here another Use of the Table in Page 7th will appear for the 4 Acids are there set down according to their Force of Attraction to the Alkalies. The Vitriolic acid being the strongest the Nitrous next &c we therefore see by the Table what Salts will decompose each other.

Simple Salts may be precipitated by each other from their Menstruum when by their Union they form a Neutral Salt leſs soluble than they are alone.- The Chrystals of the mild vegetable may also probably be precipitated by the Caustic for the same reason which Neutral Salts are which shall be immediately mentioned.

Neutral Salts may be precipitated

×by Sp^t of Wine which attracts water more strongly than they do. An Instance of this was given in Part II^d to illustrate Coagulation.— They may be precipitated also by the fixt vegetable Alkali. Many Theory's have been proposed to account for this that which is most common & probable is that the fixt Alkali has a Quantity of Water which is essential to it but being deprived of the greater part of this in the state we ordinarily have it it attracts it from the Neutral Salts & thereby precipitates them. In support of this we find that no precipitation takes place if we use the Alkali in a fluid Form or even if it is not perfectly dry & this is the reason why this Exp^r so seldom succeeds. There are grounds to think that the Precipitation of Neutral Salts may be effected by highly concentrated Acids for they have the same property with regard to Water In doing this however we must use the Acid that forms the Neutral

× Alcohol having a Qy of Camphor diſsolved in it
on being exposed to a certain degree of Heat will fly
off leaving the Camphor behind altho when undiſsolved
the Camphor is equally volatile with the Alcohol &
even when the heat is so great as woud have volatilized
the Camphor when seperate

else a Decomposition would ensue. — On this Principle we can explain a Rule given in many Books for the making of Glaubers from common Salt viz to add the Vit: Acid in much greater quantity than would be neceſsary to separate the Foſsil Alkali. — the superabundant Vit: Acid must undoubtedly act in precipitating the new formed Salt. ——

11. Salts are recovered from their Menstrua by evaporation to Dryneſs since Water is more volatile than all Salts except the Vol: Alk: they can all be got in this way. There are however great Inconveniences attend this Practice for firstly if we use a boiling Heat we not only lose a part of the Salt by its being volatilized with the Water but there is also a Decomposition happens & part of the Acid flies off. — And 2dly If there are two Salts both diſsolved at the same Time in Water we get them both blended for these reasons this method is never used

except 1stly When we cannot chrystallize the Salt 2dly When it is neceſsary to have it in a fine Powder which it is most easily reduced to by stirring it when Evaporating. This is the case in preparing Nitre for Gunpowder.——

111 Salts are likewise recovered by Chrystallization Most Saline Bodies concrete into regular Polygons of a certain degree of Transparency so as to resemble Rock Chrystal and are on that acct called Chrystals and when recovered from their Menstrua in that form said to be Chrystallized.— This is done by taking away all the means by which they were diſsolved. viz 1st by diminishing the Menstruum 2dly by diminishing the Heat 3dly by diminishing the Quantity of Air in the Menstruum.——

1stly The Menstruum is diminished by evaporating it.— Thus if we set a Solution of common Salt on the Lamp Furnace it will be found to Chrystallize when the Water begins to be diſs

(

ipated. This Diſsipation is aſsisted by a free Circulation of Air which seems to attract the Water. ——

2dly The Heat is diminished by removing the Solution into a cold Place.— If a great Quantity of Nitre be diſsolved in boiling Water & this removed to a cold Place the Nitre will immediatly begin to chrystallize at the bottom of the Phial. 3dly The Quty of Air is diminished by means of the Air Pump in which Case we shall find a Chrystallization begin. Chrystallization is preferable to the other two methods of recovering Salts 1stly because Salts keep best in the form of Chrystals 2dly It enables us to distinguish Salts by the Form of their Chrystals and thereby to know when they are adulterated 3dly by this we can separate two Salts that have been both diſsolved in the same Water.— For instance suppose in 6 pts of water we have 1 lb of common Salt & as much Nitre diſsolved— by diſsipating

3 ℔ of the Water one half of the Nitre will be precipitated because Water will diſsolve only 1/6 its weight of Nitre but the whole ℔j of common Salt will remain suspended. For ℔j of common Salt is only sufficᵗ to saturate ℔iii of Water If now we set this ℔iii of Water which contains ℔j of common Salt & 1/2 a pound of Nitre on a boiling Heat so as to diſsipate still more of the menstruum - suppose 1 pound then one third of the common Salt will be chrystallized but the 1/2 Pound of Nitre will remain suspended. because the diminution of the menstruum with regard to it is compensated by the encrease of Heat. whereas common Salt is equally soluble in cold as in hot water. ——

By thus leſsening the Menstruum and increasing the Heat alternately we can get almost the whole Quantity of both these Salts pure This is practised in all great Works for the making of Nitre. —

+ Nitre when kept in a boiling heat will not
chrystallize tho the Menstruum be near Evaporated

The same might I imagine be made use of for procuring the Foſsil Alk: from Kelp which is made by burning the Sea-Weed the Ashes of which contain Foſsile Alk: Common, & some Glaubers Salt.– Now the Foſsile Alk: has the same Property with Nitre viz of being more soluble in Heat. —— Altho great Attention is requisite to the proper Time for withdrawing Salts from the Heat yet no general Rules can be given A very common one in Books on this Subject is to do it when a Pellicle begins to form on its Surface But this only answers in Salts that are equally soluble in the Cold as in the Heat such as common Salt for Nitre would not form this Pellicle tho Evaporated to dryneſs.+ – With regard to it when we are unacquainted with the Proportion of it contained in the Water the only way to judge is by taking out some of it frequently and observing if it chrystallizes in the cold.– Salts when their Menstruum is diminished will chrystallize quickly when exposed to sudden Cold & by putting them into shallow broad Veſsels.— This however is a Practice I would by no means recommend for it makes the Salt fall down either in a Powder or very small Chrystals On the contrary we should withdraw em very slowly & then the chrystals will be large and regularly formed

In the making Neutral Salts I know no general rules that should be observed. Boerhaave and others seem very anxious to have the Acid and Alk: put together in very exact Proportions to saturate each other. But this is not only impracticable since these Proportions are not determined with any Certainty but besides if it were practicable I question if it ought to be done. We observed above in the making of Glaubers Salt that an overquantity of acid was of service and that the fixt Alk: precipitates Neutral Salts also. These two facts would lead to a different Rule but they are not general.— For the Vit: Acid is the only one that has that Effect. And the veg: Alkali sometimes prevents Chrystallization as in the making

common Salt. ——

Of the Chrystals of Salts.

Different Salts when chrystallized aſsume different forms of Chrystals quite distinct from each other. ——

Vitriolate Tartar - -	Chrystallize in the Form of	6 sided Pyramids
Glauber's Salt - - -		Hexagonal Prisms
Nitre - — — —		
Common Salt - —		Cubes
Digestive Salt - -		

These Forms are found to vary in different manners of Chrystallization in different Veſsels. This has led some to think that when certain Veſsels &c were used the Chrystals would always form differently from what they would do in other. Dr Hill says that Common Salt according to a certain Method of Chryst:allization shoots into oblong Parralellipipedons. Common Salt often forms hollow Pyramids but this cannot confute the Opinion of Cubes being the proper form of its Chrystals For the manner in which these Pyramids are formed is this. — 1st a Cube is formed on the Surface of the Liquor which sinks a certain Space but has not Gravity enough to carry it to the Bottom. On each Side of it a new cube forms which carry it still farther down and then other Cubes are formed in the Same Way This is the form of the Table Salt till it is broke down for use On the whole I imagine the forms we before set down are eſsential to the Salts and that they always will concrete in that Form when the Chrystallization is properly managed.——

x It is commonly observed that the Chrystals of different Salts have different directions in their Formation— Those of Nitre pointing upwards those of Glauber's Salt horizontally Thus if we lay a Phial full of the supersaturated Solution of Nitre on its Side in Cold Water the Chrystals will all be directed from that Side.—— There are some Salts which begin to chrystallize at the Bottom as Nitre and others at the Surface as common Salt & all those that form a Pellicle during Evaporation If we introduce a α This is a Mistake it being now found that the Chrystals of all Salts whatever are directed from that Part where the Cold is sufficient to cause them to Chrystallize Thus if an a Vial full of a supersaturated Solution of Nitre in hot Water we place a wet Cloth on any Part of it so cold as to cause a Chrystallization The Chrystals of the new formed Salt will all be directed from that Part whether it be the bottom top or side This applies to common Glaubers & all others

The Expansion of Matter upon Concretion seems analogous to the Freezing of Water the Expansion of which was so powerful as to burst a bomb shell This probably depends on the Air which the body contained when fluid in a fixt State being by Congelation restored to an elastic one & probably ~~it~~ the same hold good in the Case of Neutral Salts as tis likely that the Water in them is in a solid form & in the State of Ice In proof of this we see it part with its Air_ This may Account likewise in some Measure for ye Opacity of several of them Salts however do not concrete without some Motion the smallest however is sufficient as the slightest Inclination of the Containing Vessel

x 2. Upon Concretion a sensible Warmth is produced upon the Principle that Concretion generates Heat & Solutⁿ. cold The bulk of the Mass is also increased upon Concretion as are all Bodies reduced to a solid from a fluid State by this means the beautiful Casts of Figures are made in Gypsum or the Selenitic Salt.

x viz those first chrystallized

By applying Oil to the upper part of the Vessel the Salts may be directed to shoot in any form —

stick into the Solution of Nitre Chrystals will form round it and our common Sugar Candy is chrystallized in this manner.— All this shews that Salts never chrystallize unleſs when in Contact with some other Body. Either the Bottom or Sides of the Veſsel or the external Air or some other extraneous Body.- This is shewn also by the following Exp^t Calcine a Quantity of Glaubers Salt & thereby deprive it of the Water neceſsary to give it the Chrystalline Form Then weigh it to find how much it has lost of its weight & then add exactly so much Water When this is done exclude x the external Air by corking up the Phial in which they are contained & the Water will continue fluid Uncork the Phial & admit the Air & immediately the whole will concrete into one maſs of Glaubers Salt a.

The Chrystallization of Salts in those remarkable Forms called the Vegetation of Salts is accounted for thus. If a Quantity of common Salt is diſsolved in a quantity of Water upon Evaporation the Salt will begin to chrystallize round edge of the Veſsel & as the Liquid will ascend thro these Salts + on the Principle of Capillary Tubes in this Manner a second Chrystallization will be formed above the first & will proceed in this Manner untill the Chrystals will often rise above the Surface of the containing Veſsel provided the Bottom of the Veſsel be placed in hot sand so as to render the chrystallization beginning there

Of Particular Salts.—

In treating of Particular Salts and all the other forms of Bodies we propose to pursue the following Plan. And where at any Time we shall be deficient in some of the Parts of it, it will be owing to a want of Facts and a Place should be left for it to be filled up when these are collected.—

1st 1st We may enquire whether they are native or artificial & if native whether they are found pure or joined with other Bodies and if so what Bodies they are joined with This may be called their natural History.—

2dly We give an Acct of the Operations by which they are procured from these Bodies for the Purposes of Art &c—

3dly We will give the History of their Chemical properties & their relations to & effects upon other Substances. This is more properly their Chemical History.—

Table of the Solubility of Salts. Speilmann

Terra foliata Tartari	470
Sal Sedlitzensis	384.
Sacch. Thornæi	360
Sal Epsomensis	324
Sal Vegetab.	312
Sal Tartari	240
Vitriolum album	210
Sal Gemmæ	200
Sal Sodæ	200
Sal Ammoniac	176
Sal Communis	173
Sal Mirabilis Glauberi	160
— Lotharingici	160
— Digestiv. Sylvii	160
Sal Polychrest. Rochelle	137
Vitrioli cærul.	124
— viridis	80
Nitri depur.	60
Sal polychrest Glaſseri	40
Tart vitriol.	30
Merc. sublim.	30
Boracis	20
Aluminis	14
Sal. Vol. Succini	5
Arsenici	5
Tartari crudi	4
Cremor Tart:	3.

Grains diſsolved in one Ounce of Water

Of the Vitriolic Acid

1 1st Of its Union with Saline Bodies

The Vitriolic Acid is not found native in any of the three neutral salts which it forms except Glauber's Salts because the Veg: & Volatile Alkali are not Native The French Chymists have found great Quantities of Glauber's Salts in many Parts of the Earth I too have found a Compound Salt which greatly resembles it in this Country. But this is an earthy Salt composed of Vit: Acid & Magnesia Alba & is on that Acc^{t} sometimes called Magnesia Glaubers Salt I am apt to think it is this Salt which the French have got at least that there are only one or two Exp^{ts} which they have made that would seem to shew it to be the true Glauber's Salt. We shall however allow that the true Glaubers Salt is sometimes found native.—

2^{d} 2^{dly} Of its Union with inflammable Bodies

Fossil Oils are thought to contain the Vitriolic Acid but it is not obviously present in them we only infer it.——

Sulpheur is the only inflammable Body in which we can say it is contained. This both in its pure State & when joined with other Bodies as the Pyrites will be found to yeild the Vit: Acid in great abundance.

3 3dly Of its Union with Metallic Substances

These are 3 metallic Bodies viz Iron Copper & Zinc with which it is found united These Combinations are called Vitriols when joined with Iron Green Vitl with Copper Blue Vitl & with Zinck White Vitl. The last is rarely found & some have denied that Blue Vitriol is ever native. But I myself have found of late some Instances of it. The Vit: Acid may be thought to be joined by Nature with some other Bodies because it is found in their Ores But this is owing to the Pyrites or Sulpheur which is always present in these.

4 Of its Union with Earths.

It is only the 1st kind of Earths viz the absorbent with which it is united.

We obtain it in three sorts of these viz

1st the Calcareous as the Selenites or Gypseous gypsums
2d A Kind of Earths called Magnesia
3d Earth of Alumn This is commonly recko=

α. In the Proportion of $^{15}/_{16}$ or more.

=ned a a peculiar kind of Earth which is only to be found in the Earthy Substance which it forms with the Vit: acid.—Namely Alumn.— Tho we now see that it is present in Clays.—Alumn is met with both in its Chrystalline State in the Bowels of the Earth & diffused in Ores with other Bodies.——

5 Of its Union with Watery Bodies

These Earthy Salts are all often diſsolved in Water And in that way the Vit: Acid may be said to be contained in it.— But Water is also said to contain it pure & not united with any other Body. If this is sometimes the case it may be reckoned an Instance of the Vit: Acid existing in its pure State naturally for we may consider it as such tho joined with Water. Since we never have any of the Acids even when considered as pure but what contain a portion of Water in their Composition This Fact however is much to be doubted It is true that Pyrites & Sulphur itself are liable to a deliquescence & Decomposition In which case the Vit: Acid joins the water but this is very rare & never happens but in large Subterraneous Caves where

Metals & Coal have been wrought & where the Air has a free communication by which it is immediately carried off being when it is separated from the Sulphur in a volatile State as we shall soon have occasion to shew. We c cannot therefore in this Instance reckon it a pure Fossile.—

6 Of its Union with Aerial Bodies

It has been the Opinion of many that this & the other acids are present in the Atmosphere. The proofs of the Vit: Acids being there are very equivocal The chief are the following.—

1st The fixt Veg: Alk: if exposed to the Air melts per Deliquium & afterwards chrystallizes in a Salt which has the appearance of Vitriolate Tartar. There are not however proofs of this being actually Vitriolate Tartar & Veg: fixt Alk: forms into Chrystals of the same kind.—

2 Silks exposed to the Air have their Colours changed & Metals contract rust & are corroded. But neutral & alkaline Salts corrode these as well as Acids and perhaps a neutral

Salt may in these cases undergo a Decomposition by the joint Action of the Silks or Metals & the Air. Tho this is but conjecture yet it is useful to prevent our forming rash Conclusions by pointing out the Possibility of a Fallacy in such Cases. ——

3. The Vitriolic Acid has been supposed floating in the bowels of the Earth & not without great Appearance of reason: because of the Quantity of it that exists there & that those compd Salts in which it is contained are liable to a Decomposition in which case it would be volatile. And it is confirmed by the deleterious Vapours in Mines which hurt & destroy the life of Animals in the same way with the Vit: Acid.— But in answer to all this it may be alledged that there are so many bodies in the bowels of the Earth that it attracts that it would immediately on being decomposed join them & cannot therefore continue permanently in the form of a Vapour. — That there are other Vapours very different from Vit: Acid which destroy or hurt Life. ——

The inflammable Vapours of Mines are brought as another Proof but these would only be instances of the Vit: acid in Composition. This Supposition of its existing in the Air has procured it a Name by which it is often mentioned viz Sal Acidum. Vagum Universale.—

There is one very strong Instance of its Universality- viz its being always present in the electrical Matter which is generally diffused over all Nature. This is shewn 1st by that Sulphureous Smell which is always perceived during electrical Experiments & which is the Odour of the Vitr: Acid. 2d If the wire be brought from the Gun Barrel in an Electrical Machine to a persons Tongue who stands on a Cake of Resin it gives no Shock but has an evidently acid Taste.—

3dly The Conical Flame which issues from the Gun Barrel when brought within a certain Distance has the same Effect with Acids on Veg: Blues

It changes the colour of a pale rose or Violet to a red colour.—

As every Body in the State of Vapour permanently is to be considered as Aerial which the Elect: Fluid undoubtedly is we may hold this as an Instance of the Vit: Acid in Aerial Substances.

Having thus considered what forms of Bodies the Vit: Acid is found in we shall see next whether it is to be found in the three Kingdoms of Nature viz Animal Vegetable & Foſsile & in treating of other Bodies we propose to do the same

First The Animal Kingdom

The well known Substance called Phosphorus contains a Substance which has been thought to be Vit: Acid because it has some properties in common with it. But there are such differences between them that we cannot till farther Experiments are made determine whether this is a Variety of the Vit: Acid or an Acid—sui generis.

In the Vegetable Kingdom

? 1st Many veg: Substances when treated for their eſsential Salts are said to yield a Neutral Salt like Vitriolate Tartar.—

2d All Vegetables that we burn in order to get their fixt Alkali are said to give also a quantity of Vitriolate Tartar. But we have room to doubt if this is not made by the action of the Fire & did not exist in its proper form in the Plant as most People imagine the fixt Alk: itself is produced.——

3 The Foſsile Kingdom

The presence of the Vit: Acid in various Foſsils has been already shewn in treating of its Union with the six Forms ——

11 IId The manner we procure it.

The Vit: Acid may be procured from all the Bodies above mentioned with which it is united by Nature. But it cannot be obtained from many of them with Advantage On this Acct we have not at any Time practised on any but

1 Vitriol 2d Alumn 3d Sulphur.

1st Alumn

This has been long since disused because it may be got at a much smaller Expence from the other two we shall therefore paſs it over. ——

2 Vitriol

The only kind of Vitriol made use of to get the Vit. Acid is the green commonly called Copperas of Iron. It leaves the Iron & rises in Distillation without carrying over any of that Metal or at least very little along with it It can only be practised on in great Works & in places where there are great Quantities of Vitriol & Fuel. —

The Proceſs may be seen in Macquer & Boerhaave. We shall only give a reason for a Rule laid down which they have not — "The Rule is to calcine the Vitriol before subjecting it to distillation". ——

1st Reason The Chrystals of the Vitriol contain a Quantity of Water which may be diſsipated by the first Distillation in order to render the subsequent purer & to procure the acid more concentrated.

2d We get free of the Vapours of the Water which render the danger of bursting the distilling Veſsels leſs since that Fluid is the most elastic of any in that State The 3d is That the Vitriol being fusible in its chrystalline Form in consequence of its Water melts in the Veſsels & when the Water is diſsipated it concretes & forms a crust in their Bottoms.— And when this becomes unequally heated it breaks the Veſsels or even does so by taking on too great a Degree of Heat

Now calcining the Vit: first prevents this because when it concretes after the diſsipation of the Water there is little matter whether the calcining Veſsels burst— and if you then take it out and reduce it to Powder it will not melt again but continue in that Form.—

Sulphur.

It was but of late that the Vitriolic Acid was obtained from this Substance in near the Quantity it contains of it tho it has been long practized on for procuring it. It cannot be separated from it by any other way than

Inflammation. The old proceſs called Distill=atio per Campanam we shall not describe nor the Improvement Homberg attempted or that of Dr Lucas of Dublin who published in the medical Eſsays since at first from lb j of Sulphur only ℥ij of Vit: Acid was extracted & they never rose higher than ℥ij from the Pound whereas they extract now from that Quantity ℥xii And are enabled to sell it cheaper a great deal than when it was extracted from Vitriol The inventor of the present method is not well known it is supp=osed to be Com: Drebel of Holland But whether he communicated the Secret to any one when he died or not it had been for a long Time neglected till of late some Chemists in England became masters of it & got a Patent for extracting Vit: Acid from Sulphur.

Others have discovered it & the Patent not extending to Scotland have set up a Manufactory at Preston Pans & seem to have improved on the method practised in England The Secret I am unacquainted with tho I imagine the Hint has been taken from a Scheme proposed by Cramer which would answer in large works

Dacey the Author of the Elaboratory laid open pretends that it consists in adding Nitre to Sulphur by which means the inflammation can be kept up in pretty close Vessels. This Gentleman is a great pryer into Secrets but I dont think his Authority such that we ought to give Credit to this till proper Experimts are made to confirm it ~~or till~~ or till the method is made public by those who are undoubtedly acquainted with it. Whatever that may be the Vit: Acid which is now got from Sulphur is greatly better than what was formerly sold in the Shops. It was formerly of a thick unctuous consistence of a dark brown colour but is now thin of a light brown Colour & pretty transparent It is still however greatly diluted with Water & must undergo another Operation to fit it for many purposes of Chemistry both to get free of this and also of a Quantity of Phlogiston it contains.——

Of the Manner of Concentrating ⊕

This may be done 1st by Evaporation in the open Air for the Water & Phlogiston are both more volatile than the Acid So that we may put it into a common Florence Flask in a Sand Heat and allow it to evaporate till [illegible] of [illegible] [illegible] [illegible]

to the [illegible] appear [illegible] [illegible] [illegible]

[illegible] [illegible] of the [illegible] [illegible] [illegible]

[illegible] the word [illegible]

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[illegible] [illegible] [illegible] [illegible] [illegible] for

[illegible] [illegible] [illegible] [illegible] we can

[illegible] [illegible] [illegible] [illegible] Which of

[illegible] [illegible] [illegible] the best

the Signs of Concentration (which we are abt to mention) appear In this way however there is always part of the Acid lost & therefore it is but little used.——

2dly By distillation in close Vessels but here great Care must be used to prevent the Vessels from breaking which would very readily happen. For the Vit: acid is of so fixt a nature that it takes a very great degree of Heat before it is converted into vapours & consequently when applied to the neck of the Retort if cold must evidently break it. The means that are used to obviate this are to keep the neck of the retort warm by heaping up Sand about it. For which Purpose a large Brim is fitted to the sand Bed of the Furnace with a cylindrical Hole to transmit the neck of a Retort.—

Of the Signs of Concentration.—

1 The Chymists commonly desire to keep the Vit: Acid in the Retort till it becomes of a limpid transparent Appearance.— But this mark is very ambiguous for if to a concentrated Vit: Acid we add a great Quantity of distilled Water it does not affect its Colour in the least.—

so that we cannot know by this that it is freed of its Water.——

2^{dly} They propose to try its degree of corrosibility on Animal & veg: Substances Thus if we emmerse a Straw or Feather into a concentrated Vit. Acid they aſsume very quickly a black appearance & shrink up. But this can never determine the strength of the Acid with any exactneſs since a leſs concentrated Acid will have the same effect tho not perhaps so quickly The only rule we can determine by with any certainty is——

3^{dly} To examine its specific Gravity For since its Concentration consists cheifly in separating its Water which is by far a lighter Body This Concentratn will be always as its specific Gravity.— The specific Gravity that the Vit: Acid may attain to is not I believe ascertained But if it be to that of Water as 18 to 10 it will answer all the purposes of Chemistry This may be known by having a Bubble

of Glass which nothing but that specific Gravity will keep afloat. 2 by the Hydrostatical Ballance & 3dly by comparing equal Bulks of it to water.

Of the Volatile Vit: Acid

We must now observe that we get this Acid in two very different States either extremely fixt & quite inodorous (as that in the Shops (whose concentration we have been treating of) or Volatile and strongly odorous. Tho these have a considerable difference between em yet we must still reckon em the same Acid since they have most other Properties in common & are easily convertible into each other. Dr Stahl discovered by accidt the way of procuring this volatile vit: Acid.— The vessels in which he was distilling having cracked by chance he found that the Acid came over in a volatile State He afterwards made purposely an opening into them & the same effect always took place. This he ascribed to the Phlogiston of the Charcoal being admitted.—

but I imagine it is owing to a kind of Air that is always present in the Atmosphere & is attracted from it in those circumstances by the vit: acid. Besides this the Vit: Acid is got in a volat: State from all inflammable Bodies with which it is united by nature or when they are joined to it on purpose. – It is therefore got in a volat: State

From Oils
Ardent Spirits
Sulphurs.

We might be led to doubt this from the Vit: Acid which is manufactured from Sulphur being fixt but tho this is the state in which we get it in the Shops yet I imagine it rises volatile from the Sulphur & becomes afterwards fixt by the addition of Water This is almost put beyond a doubt by the following Exp^r of D^r Stahl. – In a solution of veg: Alkali he drenched some peices of Cloth & then formed them into hollow Cones & suspended them over the Fumes of burning Sulphur

+ This is not properly a vitriolate Tartar

When they had continued there for some Time they became friable & were crusted over with a vitriolate Tartar.+ By joining to this a a fixt Vit: Acid (which we may observe has a stronger Attraction to alkalies than the volatile) a Decomposition ensued & he got over a volatile vit: Acid.——

When we add a fixt vit: Acid to Hepar Sulphuris we obtain a volatile one but this is precarious. If we join the fixt vit: Acid to some metallic Substances as Zinck & distill it over it will be in a volatile State From this Glauber proposed an improvement in the way of extracting Vit: acid from Vitriol.——

Viz 1st to add a Quantity of Zinck to green Vitriol which would then be decomposed (Zinck having a stronger Attraction to the Vit: Acid than Iron) & then by distilling from the Zinck the Acid would arise with much leſs Fire & without a previous calcination But by this method the Vit: Acid that is obtained is extremely dilute & the strongest part remains in the Retort. ——

Of the Chemical Properties of the Vitr: Acid. ——

111- In considering the Chemical properties both of this & of all the other kind of bodies we will 1st mention such as they have taken by themselves without having regard to any other Substance & 2dly those which respect others following here the general division viz into Salines 1st Infl: 2d &c

Its Properties taken by itself

1st Tho the Vit: Acid is commonly fluid yet we have it frequently in a solid Chrystalline form. — This is not according to the intensity of the Cold for it is frequently fluid in a great degree of Cold & at other Times solid in a much less. — I believe it is always fluid when highly concentrated & commonly considerably diluted when in a Chrystalline Form It seems to become solid in consequence of a Portion of Phlogiston adhering to it d Mr. Pollock [illegible] of [illegible]

[illegible]

[illegible] Magnum.

The [illegible] [illegible]

in different degrees [illegible]

from the most White Shade to that deep

[illegible] which is the

[illegible] commonly [illegible]

[illegible] the [illegible] to be that

[illegible]

[illegible] the heaviest

[illegible] with [illegible]

[illegible] This

[illegible] good

[illegible]

and Mr Hellots way of making L. Thick: Glaciat: de Vitriol: is by adding Phlogiston see Macquer.

2.-The vit: Acid has water adhering to it in different degrees more or leſs from its most dilute State to that degree of Concentration which is the greatest we commonly arrive at. viz where the specific Gravity is to that of Water as 18-to-10.

3dly In its fix'd State it is the heaviest fluid Body we are acquainted with besides Quicksilver but when volatile this is not the Case because it has a great Quantity more Water adhering to it & we cannot separate this without rendering it fixt.

4-It is quite colourleſs & transparent when Pure & not mixt with any other Substance but as we have it in the Shops it is always brown or black by means of the Phlogiston which is joined with it & more or leſs so according to the Quantity adhering to it.—

Its Properties with respect to other Bodies.

1st The other Saline Substances

α α-- Joined with other Acids it effervesces & generates heat with them- hence a proper Mixture seems to take Place.- The heat indeed might be owing to the union with the Water of the other Acid but there is reason to think a tertium quid is produced since we know that by the Union of the other two Acids Nitrous & Muriatic that to be the Case.— The Compound Aqua Regia poſseſsing one Remarkable property distinct from the other two constituent Parts viz that of diſsolving Gold.

β It unites with all alkalies & has been generally said to produce an Effervescence with them. But there is one State in which Alkalies are got in which they unite with ⊕ without any Effervescence. The generation of Heat

& the Production of a neutral Substance are Phænomena that attend constantly the Union of Vit: Acids & Alkalies. — They also unite in determinate Proportions but these are not properly ascertained Five Drachms of Vit: Acid are said to saturate one oz. of fixt Alkali. ——

It decomposes all the other Acids. —

2.-Infllammable Bodies

The vit: Acid unites with Oils of all kinds with heat Effervescence & Fumes & it changes the Oil into a black Colour tho they were both colourless before. — Exp.^t Into essential Oil of Turpentine pour a Quantity of Vit Acid it at first will fall to the Bottom on acc.^t of its greater specific Gravity but on shaking the Phial an Effervs will immediately appear the Colour will become black & Odours will issue very different from that of the essential Oil viz. exactly like that of burning Sulphur. —— The Fumes that arise from the mixture of any other Oils whatever with the Vit: Acid will have the same Effect. ——

B The Vit: Acid joins ardt Spirits without any observable change of Colour if the Sprt is pure & unmixt with any other oily matter. There is always a considerable degree of Heat generated & fumes arise not of a Sulphureous smell but such as appear fragrant to most people being that of the vit: Æther which is made by the combination of the Vit: Acid & Ardt Spirits & is to be treated of when we come to give the Chemical History of Ardt Spirits. ——

In the same way we propose to refer the Acct of the different Compounds that result from the Union of the Different simple Forms till the Nature of both these be explained It is difficult to say whether the Vit: acid can be be joined to the 2d Class of inflammables When on on the Subject of Sulphur

we shall shew that it consists of this Acid & another Substance abt the nature of which Chemists are not agreed. —

3. – Metallic Substances

α The vit: Acid joins all the metals except Gold & some tell us also that it may be united with that metal but this is doubtful as sufficient Expert^s have not been made to determine it. —

β It also dissolves all the semi-metals at least such as were formerly known. For Nickel & Platina have been so lately discovered & it also so late since Cobalt was known to be a semi-metal that its effects on them are not properly ascertained. Tho the vit: Acid acts so universally on metallic Substances yet there must be a difference in the manner in which it is applied to different Metals & semi-metals. —

In order to dissolve Zinck & Iron it must be in a dilute State for when concentrated it will scarce corrode them.

It must be a little more concent=

rated to diſsolve Copper but then it does it throughly in the Cold whereas all the other metallic Substances are only suspended by it in a boiling Heat & when left to cool fall down again in a corroded form These Facts will be more fully mentioned when we come to the metals.

4 Earthy Bodies.

It diſsolves all absorbent Earths and hence we have four kinds of earthy Salts formed by their Union.

1st with calcarious Earths it forms Selenites
2d with Magnesia – the spurious or Mag: Glaub: Salt
3d with Earths of Alumn – Alumn.
4th with animal Earths – a 4th kind of Salt.

5 Watery Bodies.

The vit: Acid joins Water very readily but it is a question if it is in the Way of mixture properly so or Solution When Water is in a fluid Form it generates Heat but Cold when converted into Ice.

O dear [illegible]

[illegible] as the [illegible]
something [illegible] from [illegible]
[illegible]

[illegible]

6 Aerial Bodies. ——

It acts on the common Atmosphere by attracting Water from it And I am of Opinion that it unites with Mephitic Air But as this is the first Time that I have considered this sixth form of Bodies in a Chymical View as entering into the Composition of others I have as yet made so few experiments with regard to them that nothing explicit can be expected on this Subject. ——

Animal and Vegetable Substances

α The vit: Acid unites with these generates heat & strikes a black colour with them but it is not determined whether it acts on the whole of them (as they are all greatly compounded) or only on some of their Parts. ——

β It prevents all the three kinds of Fermentation viz the acetous & vinous in vegetables & the putrefactive in both Vegetables & animals & is therefore their Antiseptic. ——

—We have thus mentioned all the most remarkable properties of the Vit: Acid but we must observe now that what we have said was only meant of the fixt for in its volatile State it differs considerably we shall now therefore examine the relation of this to other Substances

—NB It is impossible to concentrate this volatile Vit: acid because in distilling its Water from it that Matter is also separated on which its Volatility depends. ——

α —First the same Phænomena accompany its
* Union with Alkalies as that of the Fixt
β Vit: Acid: Its action on oily matters are inconsider-
able on acc^t of the ▽ it contains for it
has very little Effervescence with them & does
not strike a black Colour When joined to
Ard^t Spirits no Æther is produced. ——

* Add this.— But less Acid saturates more Alk: & any other of the 3 acids will decompose a neutral Salt made by it as will also the fixt. ——

γ. It unites with Metallic Substances & a less Quantity of it saturates a greater Quantity

of Metal as well as of Alkali. ———

There is nothing different in its Union with Earths It generates leſs heat with Water & I believe leſs Cold with Ice but probably not in the same Proportion. ———

Its Volatility I imagine depends on a Quantity of Mephitic Air in its composition but not (as Stahl thought) on the Phlogiston. — but we have already said that nothing explicit was to be expected on this Head & we shall refer what more is to be said on it to the history of mephitic Air. ———

The Volatile Vit: Acid has leſs effect on Vegetable & animal Substances than the fixt

- Before we leave the Subject of the Vit: Acid we shall give some Acct of the many names it has at different Times gone by. as this may be applied to the reading of many Chemical Authors. ———

The Different Names of the Vit: Acid

1 Oil of Vitriol
2 Spirit of Vitriol
3 Spirit or Acid of Sulphur
4 Ol: Sulphuris per Campanam
5 Spirit of Alumn
6 Acidum Calcanthi
7 ———— Primogenium
8 ———— Catholicum
9 ———— Universale
10 ———— Aereum
11 ———— Atmosphericum
12 ———— Vagum Foſsile

The cause of these names being applied & the impropriety of such Applications are pretty evident. ————

Of the Nitrous Acid.

We proceed next to this Acid because it is next in specific Gravity & force of attraction to the Vit. Acid.

I Its Natural History.

The natural History of this is not so well ascertained as that of the Vitriolic so that we cannot treat it in so full & regular a manner. Great disputes still subsist about its origin among the Chemists but these also respect that of Nitre so that we shall not enter upon them here. The proper Matrix of the Nitrous Acid is that upper part of the Soil or Staple in which Vegetables grow & there it is in laid up in great Quantity As we get it from this by distillation some have thought that it exists there in a pure State. But when we come to give the natural History of Nitre we shall shew that it is joined with the fixt Alkali. Indeed the saline seems to be the only one of the six forms to which it is united by Nature. ———

The animal Kingdom & vegetable

– The Nitrous acid properly exists in the soil in consequence of veg: & animal Substances putrefying there. – But it is not certain whether it exists in them before Putrefaction. It is my Opinion that it does not tho others think differently & there are some Experiments which might lead us to think it was to be found in Vegetables but these are not conclusive. If this was the case we might suppose it to be in the Atmosphere as it would probably escude from them.

The Fossile Kingdom

The nitrous acid is not found in any Fossile Substance as we cannot reckon nitre as such For some acc^ts of its being produced in a trifling Quantity at a considerable Depth can only shew that it has been washed down from the Earth ———

II The way we procure it. —

Nitre (from what we have said of its natural History) will be beleived to be the only Subs

=stance which we extract it from for Use — This may be done two ways either by the Action of Fire or by elective Attraction.—

1st By the Action of Fire. Till of late we thought that it could never be got in this way. But tho it fuses both in open & close Vessels and cannot be decomposed when put in alone yet Mr Pott. has shewn us that if you add a fine Sand to keep its Parts separate & prevent its Fusion that the Acid will rise in Distillation and come over pure into the receiver (see Part II on the means of assisting Solution) This indeed was an old Practice but it was thought then an elective Attraction took place which Mr Pott shews not to be true

2 By Elective Attraction As the above method cannot be used without a great apparatus & expence the common method is to add the vit: Acid to Nitre which decomposes it by means of attracting the fixt Alkali.—

And here we may either make use of the Pure Vit: Acid or as joined with the Metals or Earths. viz: Green Vitriol or Alumn

(46)

1 1st When Green Vitriol or Alumn are used it requires such an Apparatus that it is become a separate Trade & cannot be practised in the private Laboratory For the particular Process see Macquer. — It might have been imagined that the Nitrous Acid when distilled in this manner would unite with the Iron of the Vitriol or the Earth of Alumn & it perhaps does so but then it is as easily volatilised from these as the fixt Vit. Acid was. but indeed it is more probable that it rises before it has Time to act upon them. ——

2 2d The distillation of the Nit: Acid by means of the pure vitriolic is also in some measure become a distinct Trade. ——

α And it ~~it~~ may be done either with the Addition of Water or without it. — It is commonly advised to add Water but I believe without Propriety For the reason given is to prevent the Vapours of the Nitrous Acid escaping thro the Luting but I do not find that there is any observable Quantity lost

in this Way And besides I believe that the Vapours of Water are more penetrating than these & by the addition of it we get the Acid in a more dilute State which subjects us to the necessity of a new distillation.— To prevent this some might think of a very different Practice viz to Calcine the Nitre as in distilling Vitriol but this is not adviseable because then indeed the Vapours of the Nit: Acid are very subtile We have only therefore to powder common Nitre before we add the Vit: Acid.

The Quantity to be used of this is not at all determinate. It would at first seem that just no more than a suffic.t Quantity to decompose the Nitre should be added because the superabundant Quantity will rise with the nitrous acid but this will happen tho the exact proportion be added And hence all the Nitre will not be decomposed. Now it is better to have the Nit: Acid with a great Quantity of the Vitriolic mixt with it than to get it purer & lose part of it since we can free it of the vitriolic Acid by a subsequent Operation & the nit: Acid is the more valuable of the two There is another reason for adding a superabundant Quantity of the vit: Acid viz that as we cannot assist the operation by the Agitation of the Vessel it will require more of it on that Acct to decompose the Nitre For these reasons I would advise to add ℔j to ℔ij of Nitre tho if we made the proportion as 1 : 3 the Nit: Acid would be purer. ——

Y - When the vit: Acid is added the Fumes that arise give us some trouble in securing our Luting To prevent this some advise the use of Tubulated Retorts but as these are expensive & not always to be got the following direction will serve equally well. —
Put the Vit: Acid in the cold when the Fumes that arise are inconsiderable To put on the Luting & have the Vessels so contrived as to be easily moved from Place to Place without breaking the Luting having taken Care first of all to have them well ground to each other. — To keep the Vessels in the Cold ten or twelve

Hours to allow the Luting to dry.— To apply the Heat gradually after that.— The Heat is to be encreased till the Nitre is in Fusion & then continued at that degree till what remains in the Retort becoming more & more consistent appears at last to be quite unfusible When this Operation is perfected we have the Nitrous Acid pure enough for many Uses. But as there is a portion of the vitriolic joined with it for some purposes this must be separated by a new operation There is also a quantity of Marine Acid in it for the Nitre commonly used for distilling Nitrous acid always has some common Salt mixed with it None of the Nitre made in Europe is free from common Salt & that which is brought from the East Indies being of two kinds a pure one free from common Salt & a worse which has always common Salt in it. The manufacturers generally use the last because it is the cheapest This marine Acid is therefore to be separated from it.

Of the manner of purefying it.

α To a fresh Quantity of Nitre add the Nitrous Acid already distilled & cohobate it The Vit: Acid it contains will leave it decompose a part of the fresh Nitre by uniting with the fixt Alk: & you will get over the nitrous acid pure and more in Quantity.

β To purify the nitrous acid from a portion of the marine we should add a portion of a Solution of Silver having first diluted it according to one of the Rules given for assisting Precipitation The Silver will by attracting the marine acid fall down in a corroded State in the form of a white Powder This Practice will also answer the intention of separating the Vit: Acid that adheres because Silver attracts it more strongly We should repeat it till no more of the Powder fall & then we may be assured of the Purity of our Acid. See Cramers Ars Docimastica

III The Chemical Properties of Ox

[illegible]

III The Chemical Properties of ⦶.

Its properties taken by itself.—

We get it in a fuming State but by adding Water to it that is altered in a great measure Fumes indeed arise in considerable Quantities while the Heat excited by the addition of Water continues. But after that they are all scarcely perceptible and if when thus diluted we again free it of its water by concentration it will not smoke so remarkably as before.

2 It can be obtained in a more concentrated State & less united with Water than any of the Acids except the Vitriolic.

3 There are different Tables of its specific Gravity under different Names as Aq:-Fort:- & Spt-Nitri but there should be no division of this Head as they only differ in their degree of dilution Rouelle brought it as 15: 10.—

4 There is considerable variety in the colour of this Acid which has given rise to many false Notions.— When

distilled with the addition of pure vit: Acid it is of a dark brown which Mr Hellot in the Memoirs of the French Academy ascribes to a presence of Iron in it But Mr Pott has sufficiently confuted his Opinion & this Colour is far from being permanent for by the addition of Water it becomes green This Green Colour has also by others been attributed to something in the acid which they call the anima Nitri. But this is very absurd for on standing some Time it loses that Colour & if after that we again concentrate it & add a fresh Quantity of Water it will not then be green as before When distilled from green Vitl it is not so brown as when pure Vit: acid is used and if during the Operation we admit the Fumes of Water into the Veſsel it aſsumes the green Colour. Lastly when distilled from Zinck it is quite transparent & pure by the first distillation In this Instance the Chemists have

[illegible] these Properties from the
[illegible] to [illegible]
[illegible] of the [illegible]
[illegible] for the [illegible] that the
[illegible] of [illegible] than the
[illegible] of the [illegible]

The Properties with regard to [illegible]

[illegible] other [illegible]
[illegible] with all the [illegible]
[illegible] the [illegible]
[illegible] and produce a compound of
[illegible] Properties which shall be
[illegible] of [illegible]
[illegible]
[illegible]
[illegible] Properties [illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]

shewn remarkably their Fondneſs for Hypostatical Principles & yet I think there is not a stronger Proof of the contrary Opinion for it seems evident that the Variety of Colour here depends on the Configuration of its Parts.

Its Properties with respect to other Bodies

1st As to the other saline Substances.

It unites with all the acids & generates Heat with them Its union with the Marine acid produces a compound of peculiar Properties which shall be considered after we have treated of the marine Acid.

It joins the three Alkalies with the same general Phænomena as the vit: But more of it is requisite to saturate a given Quantity of Alkali Homberg says that ʒx only saturate an oz: of fixt Alkali It attracts the Alkali more strongly than the two following Acids.

2^{dly} Inflammable Bodies

α The Nitrous Acid unites with Oils of all Kinds strikes a black Colour emitts Fumes & effervesces with them It generates Heat with them in a much greater degree than the vitriolic for it often produces inflammation.— This Circumstance was about 100 Years ago thought one of the most wonderful Appearances in Chymistry & imagined to happen only in particular Oils. But the Experiment is now very common & Rouelle has shewn that every Oil may be inflamed by it.

β It generates Heat Fumes & Effervescence with Ardent Spirits but never breaks out into actual Flame There is an Æther also produced by this Combination.

γ Some have told us that the nitrous Acid acts upon Sulphur but after trying Experiments with great Care to determine it I am disposed to think it has no Effect upon it.

3 Metallic Bodies.

The Nitrous Acid unites with all the Metals except Gold It diſsolves & suspends in a fluid Form all except Antimony & Tin which are only corroded by it

4 Earthy Bodies.

It joins all the absorbent Earths but the earthy Salts produced from it have not got peculiar Names. Du-Hamel started an Opinion that the nitrous acid joind to these Earths rendered em Volatile but on Examination this does not appear to be just.

5 Watery Bodies.

It unites with Water & generates Heat with it but not in so great a degree as the Vitriolic Acid. On the other Hand it generates much more Cold with Ice & more than any other artificial means can produce.

6 Aerial Bodies.

The nit: Acid when concentrated attracts Water from the common Atmosphere but not so powerfully as the Vitriolic

Animal & Vegetable Substances

It has the same effect with the vitriolic but in a smaller degree.

Ob.1 Observ: 1 - The power this acid has of generating Flame tho no inflammable Body itself distinguishes it remarkably from the other Acids We have already said that it has this Effect upon Oils tho added to them in the Cold & when united with Alkalies, Metals (and I believe Earths) It inflames on the contact of Charcoal & is attended with detonation & explosion & on this account is the foundation of Gunpowder.

Tho I think that in this Acid there is no variety but what merely depends on its different degrees of Concentration yet I shall not be positive but that there

is some diversity between its Fuming & fixt State even when equally concentrated but Experiments must decide this Question

Its different Names. —

1st Spt. of Nitre – when obtained by the addition of Earths. —

2 Spiritus Nitri Glauberi fumans when distilled by means of pure vit: Acid. —

3 Aqua Fortis when by green Vitriol. —

Of the Muriatic Acid. —

1 Its Natural History. —

this Acid like the others does not appear to be found native in a pure State. Its natural History likewise is much connected with that of the compound substances it exists in. —

It is united with the Fossil Alkali in the Form of pure alimentary Salt & this Salt is found in prodigious Quantities accumulated in the Bowels of the Earth When in a firm chrystalline State it is called Sal gemmæ or Rock Salt

Sal ammoniac: has been thought a native
β Foſsil (which consists of muriatic acid & Vol: Alkali) but this appears to be a false Notion And it seems only to be produced in consequence of inflammation after which it is found plentifully in the exhaling Soot. ——

γ -Some have alledged that it exists in Foſsile Oils but this seems equally groundleſs And an an Acid which a French Chemist thought he found in Amber was not the Muriatic. ——

The Animal & Vegetable Kingdoms

Common Salt & of consequence the Marine acid is found wherever Nitre is got & there are some late Experiments which shew it in the Eſsential Salts of Vegetables. It is matter of doubt whether that common Salt which the Urine of animals contains is only what is taken in with the Food or if it is generated there some Arguments might be brought to support the last Supposition It is equally doubtful if the large Quantity of Salt which is diſsolved in the Sea is produced in conseq-

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Def. Tension

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2. By Electric Attraction [illegible]

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=uence of the putrefact^{n} of the many animals that die in it or if it is washed out of the Rocks of Sal gemma to which the Sea has acceſs.

Foſsil Kingdom

As common Salt is a Foſsil it is of consequence to be found in this

II The way we procure the Muriatic Acid

This acid like the nitrous is procured either

1- By the action of Fire in which case we add Sand to keep its parts separate or

2 By Elective Attraction viz: the addition of Vit: Acid. And indeed this is always practised because the other method is liable to the same Objections as in the distillations of the nitrous acid Here again the vitriolic acid may be used pure or compound with metals in vitriol but the use of Vitriol is inconv^{t} because the muriatic acid volatilizes Metals When we distill with the vit: acid pure the addition of Water is much more neceſsary here than in the case of the nitrous acid because the Fumes would otherwise be so penetrating & copious that they could not be confined.

Of the manner of concent:g & purefying the muriatic acid.

α 1– As we add water in the distilling muriatic acid we get it over again in a dilute State & in order to concentrate it we must have recourse to a second Distill:n

β –There is also always a portion of the Vitr: Acid comes over with the muriatic & in order to purefy it from this Cohobation should be used but this is scarcely ever done because there are few inconveniences arise from this portion of the vit: Acid or at least they have been little attended to

The Signs of Concentration are

α –Its aſsuming a yellow Gold Colour.

β As it becomes more concentrated Bubbles of an unctuous appearance are seen floating on its Surface but these are not always observable.

γ The only sure sign is the encrease of its specific Gravity & the other two are only used because this is attended with some Trouble

The method of purification of the
Muriatic Acid is by returning it upon
a quantity of common Salt to absorb
the Vit: acid

The weight of the muriatic acid
with respect to water is as 12 is to 10 –

The Chemical Properties of the muriatic acid.

The muriatic acid is more or less fuming according to its degree of Concentration it has in the first distillation for like the nitrous acid the addition of Water deprives it of its volatility And when concentrated after that it does not recover its fuming appearance.

It cannot be got in near so concentrated a State as the first Acid. ⊕ sc.

Its specific Gravity is said to be as 12-10 but it is much to be doubted if ever exact Experiments have been made to determine this.

Its Colour when concentrated is a Gold yellow as we observed in giving the signs of Concentration.

Its properties with respect to other Bodies.

1st The other saline Substances

It unites with the other acids in the same manner as the nitrous & vitriolic acids of its combination with the last we are to treat immediately. ——

β It unites with alkalies as the two former acids do but it requires more of it to saturate them Homberg says ʒxxi of muriatic acid saturate only ʒi of fixt Alkali. ——

2d Inflammable Bodies

α - It does not unite with Oils which is imagined to proceed from its not arriving at a sufficient degree of Concentration.

β It unites with Alcohol probably only in consequence of the Water it contains for its union with it is but imperfect as we shall have occasion to shew when we come to inflammable Bodies. ——

γ It has no attraction with regard to Sulphur. ——

3 Metallic Bodies. ——

It acts universally on all metalline Substances except Gold - Zinck Iron & Copper^x are dissolved by it as likewise mercury & antimony when it is transferred to

Tin & Mo

them from other Bodies tho it does not dissolve them in the Cold in the dilute State in which we have it It only corrodes Silver Lead & Bismuth.

4 Earths

The muriatic acid unites with absorbent Earths & when it is united with Calcarious Earths the Combination that is formed is called fixt Ammoniac.

5 Watery Bodies

It unites with these with the same Appearance with the two first Acids only in a less degree

6 Aerial Bodies.

It attracts Water to it from the Atmosphere but here too its effects are less powerful

Animal & Veget: Substances

The Muriatic Acid only differs from the Vit: & the Nitrous in its action on animal & vegetable substances that it does not effect their Colour & it is on this Acid that Anatomists use it in injected preparations to erode the Substances of the Parts or Veſsels & to leave only the injected Matter.——

Its different Names

1st Spiritus Salis.-2- Glauberi Spiritus Salis because he first distilled it from Vit. Acid- 3- Muriatic Acid because Muria applies to this Salt wherever found.——

Of Aqua Regia.——

The union of nitrous & mur: acid produces a compound which has peculiar properties different from either of them & is called Aqua Regia or Aqua Regis. Its most remarkable property is that of diſsolving Gold from whence it got its name Gold having been called Rex Metallorum.——

No exact proportion of the two Acids is neceſsary to form it it

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may be made by adding common Salt or Sal Ammon: to the nit: Acid. Some are of opinion that for some purposes it is the better to use Sal Ammon: than common Salt for instance when we precipitate Gold from Aqua Regia it will not be an Aurum Fulminans if we use fixt Alk: for the Præcipitant unless the Aqua Regia has been made with Sal Ammon: But if the Aqua Regia has been made with common Salt a volatile Alk: will throw down an Aurum Fulminans. ——

What is extraordinary in this Menstruum is that it may be made either by distilling nit: Acid with Sea Salt or the mur: acid with nitre. This would seem to be an exception to what we had said on their relative Attracns But in such Cases we must suppose the nitrous Acid to be set at liberty by a portion of the vitriolic in the muriatic acid. ——

* A Swedish Chemist Affirms that Aqua Regia made with Sal ammon: has properties peculiar to itself. The presence of Sal ammoniac always enables the menstruum to take up more of the Solvend in regard to metals. A remarkable instance we have in the case of corros: Sublimate of which pure water will but diſsolve gr: xx to one oz: but by the addition of Sal Ammon it is enabled to suspend 120 Grains. —

Aqua Regia has the same effect on all other Bodies but metals which the other two acids by themselves have Excepting Gold it differs from the Acids separate in its action on all the metals diſsolving some of them more easily & suspending others in a fluid form which they only corrode. Something of this kind happens with respect to every one of them except Silver which it does not suspend

x As the Combination of Vitriolic & Nitrous Acids will cause the Inflammation of Oils which neither of them will do separately

* Because the muriatic Acid will not act upon it in a Fluid State.——

Quer. Whether the Combinations of the other Acids may not have peculiar Properties? This is probable but exper^{ts} must determine it

Of the Vegetable Acid

I Its natural History.——

This Acid has got its name from being found in the vegetable Kingdom only at least there are no marks of it in the Foſsile & those in the animal are doubtful We may get it in the primæ viæ of Animals but this is taken in with the Food & it gradually diſsappears after Eating as the Aſsimilation goes on. so that in about 12 Hours it is entirely gone & diſsappears Animal Substances undoubtedly however yeild an acid Salt as that of Phosphorus & Pismeires on distillation yeild one extremely resembling the Vegetable. But till these are better examined the name may be retained

There are various kinds of veg: Acid no leſs according to Boerhaave than five viz ——

1-Fermentatum
2-Nativum
3-Distillatum
4-Acidum combustione paratum
5-Fermentans

The two last however are in my Opinion to be struck off the list as the acidum Comb: paratum is the same with that obtained by distillation. Thus if if we thrust one end of a Stick into the Fire the other exsudes an acid Liquor. ——

And I think I can prove that the that the Acidum Fermentans called sometimes Gas being a vapour rising from fermenting Liquor is nothing but a mephitic Air. ——

* This Gas by its action on the nerves

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[illegible] different degrees of Affection [illegible]
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[illegible]

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destroys their Motion & according to its different degrees of Affection produces Stupor Lethargy Paralysis Apoplexy & at last Death. ——

II The ways of procuring the veg: Acid

—The three remaining kinds viz Native distilled & fermented must be separately considered under this Head

1st The native

This is commonly got by expression from the cells of vegetables particularly Fruits in which it is prepared by Nature & varies considerably according as it is more or less combined with Styptic or Saccharine Matters That got from Lemons is the purest & is accordingly much used both in our common Diet & Drink & in Medicines. ——

The Lemons themselves being very subject to corruption or even the Juice in the State it is expreſsed from them a method to preserve it for a considerable Time is much to be wished for as it is a Fruit only imported at one Time of the Year. —

∝ As this Juice is apt to putrify & to ferment the most probable means to prevent this would be to deprive it of the water it contains to a superfluity of which this Fermentation is owing It is therefore a practice to subject it to Evaporations having first strained it thro Flannel to get free of the Pulp by which means the water flies off & leaves the acid To prevent Empyreuma we must evaporate slowly in Balneo Mariæ & when it becom pretty consistent we should remove it. This has two advantages for it gives us the acid much leſs liable to corruption (as it would keep for Years)

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[illegible] on the other hand they

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[illegible] and [illegible]

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and it reduces it to a much smaller Bulk But on the other hand the Acid is considerably changed. It has lost its Flavour acquired a considerable degree of acerbity changed into an inelegant black Colour & is not nearly so diffusible in Water as before For these reasons another way of preserving it is also used namely By adding Spirits to it which equally well prevents Putrefaction & does no Harm by its mixture with the acid as it is most used in making Punch However this renders the bulk very inconvent as it requires the addition of a great Quantity of Spirit so that joining both these methods together will answer better than either separately. viz 1st to evaporate to one half & then a much smaller Quantity of Spirits is neceſsary.

2 The distilled veg: Acid

This might be got from most vegetables but as it abounds most in the solidest & hardest parts of them we practice only on them & particularly on the Fir Tree or pine. ———

Having cut the Fir wood into small chips we put these into a Retort without the addition of any other thing we subject them to distillation. ——

1st A Water of an acid Taste comes over then the proportion of acid encreases but at the same Time an Oil rises with it at first the essential Oil of the wood but afterwards black & empyreumatic being the same with Tar which is got by a process very similar to this. ————

After having separated the Oil from the Acid in order to concentrate it we subject it to a second distill [illegible] [illegible] [illegible] of [illegible] [illegible]

[illegible] from [illegible] [illegible] which the [illegible]

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[illegible] [illegible] proposed to [illegible] the [illegible]

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ation & that it may be as free as possible from Empyreuma which we cannot entirely prevent by any means we should stop the Distillation before the Empyreumatic Oil is come over & use a more troublesome distillation for in that case we shall have it more dilute

— By a long course of observations I am convinced that this acid has the same Properties with that we get by the infusion of Tar or rather that it is the very same acid I have therefore given it in its Place.— Ten or twenty gr. of it in 4 oz. of water make a Tar water sufficiently strong & it must answer equally well with common Tar water unleſs in such cases as the Empyreumatic Oil may be of service which are I believe very few.—

Mr Reid proposed to distill this acid from Tar.

3 The fermented Acid.—

As this acid is the produce of the acetous fermentation it may be expected I should give an account of it here but since a knowledge of the vinous must be previous to this I shall leave it till I come to the Ardt. Spirits which result from that fermentation only we may observe that the acetous Fermentation is scarcely ever practized by the private Chemist There are two kinds of fermented Acids Vinegar & Tartar

Vinegar

This for many uses of the Purposes of Chemistry must be deprived of its Water which it contains in very large Quantities This may be done. ——

α 1st By Congelation.— When any saline Body is united with Water they may be separated in this manner because the water freezes

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[illegible] that in a [illegible] Room That any
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with a leſs degree of Cold & leaves the ſaline Part in a fluid Form. This way of concentrating Vinegar was proposed by Stahl but is of very difficult Execution for a greater degree of Cold than the freezing Point 32 is neceſsary & we must watch every Film of Ice that forms and remove it immediately because otherwise it will have a remarkable Effect in preventing the acceſs of more Cold When the degree of Cold was at 25 I reduced 4 Pints of vinegar to one third of that Quantity But as the acid thus concentrated retains its former Colour or rather becomes darker it were to be wished we could apply congelation to distilled vinegar which is perfectly colourleſs.

2 By Distillation viz in the same manner in which the other acids are concentrated The Proceſs is this

Having put a Quantity of Vinegar into the Retort & fitted on a Receiver we distill till 1/4 of the whole comes over This is to be removed being little more than pure Water we get over then 2/4 more which is called Distilled Vinegar & leave the remainder because if we were to push the Distillation farther the Acid would have a very great degree of Empyreuma However as the acid we have now got is not a great deal freer of water than before we keep these remaining four parts till we have performed four distillations & then we shall have as many of them as will fill the Retort These are then added together & being again put into the Retort & distilled they yeild a pretty concentrated acid but yet a

little empyreumatic & very disagreeable to the Stomach This might be prevented by Congelation & it would prove an useful Trade in the northern Countries. 3.-The Chemists have thought of concentrating it by an union with Metals This is confined almost to Copper because veg: Acid dissolves but few & some change its properties (as Iron & Lead) & tho Zinch induces no change yet it cannot be separated without Difficulty.

Copper is used for this Purpose in the form of Verdigrease which is made almost only in the South of France A Quantity is dissolved in distilled Vinegar this is put to chrystallize & these Chrystals subjected to Distillation by which means we get the most concentrated acidum vegetale so much as to be called the acidum Radiatum or Alcahest of Zaeffer.

This however is unfit for the Purposes of Medicine as it always carries a Portion of the Copper along with it

4th Dr Stahl taught us still another way of concentrating this acid viz by combining it with the vegetable fixt alkali & then decomposing the regenerate Tartar thus formed by means of the vit: Acid. We must know that the acid in this case must be greatly concentrated since it requires ℔ 14 of it to saturate ℔ i of the Alkali & yet we gain little more than ℔ i of regenerate Tartar from this We must not however imagine that the fixt Alk: has united here with all the acid part of the vinegar nor yet that the whole Pound of fixt Alk: has entered into the

[illegible] a [illegible] by the [illegible]
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Composition of the regenerate Tartar. Undoubtedly part of both have been carried off in Chrystallizing the regenerate Tartar. The veg: Acid got in this way is in a fuming State

Tartar.

—The other fermented acid as we have it imported is like a reddish foul Earth but for most uses must be chrystallized & brought to the form of Cream of Tartar This Operation no Chemist in this Country is able to perform but at an Expence greater than three times the Quantity would cost him of what we get from France This cheap method is confin'd entirely to the Southern Parts of that Country The best account we have of it is from a Physician at Montpellier in the Memoirs of ye French Academy —

III The Chemical Properties of Veg: Acid

As very few Experiments have been made to determine the Effects of the two first Veg: Acids we must confine this Head entirely to the fermented Acid of Vegetables. The Specific gravity of this Acid even in its most concentrated State is little different from that of Water.

Its Properties with respect to other Bodies

1st The other Saline Substances.–

α It unites with all the other acids.–

β It unites with fixt alkalies as the rest only with this difference that we may add a considerable Quantity without Effervescence This however is always excited before they come to the Point of Saturation Its force of attracting them is less than that of any of the other acids & requires ℥14 of it to saturate ℥i of the fixt alkali.

2 Inflammable Bodies.–

α It does not unite with Oils probably for the same reason as the muriatic

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acid viz: its great dilution. ——

3 It induces no change on ard^t Spirits

*In a very concentrated State it may be made to unite with them. ——

4 It has no relation to Sulphur. —

3 Metallic Bodies. —

-Among the metalline Bodies the Veg: Acid only diſsolves Zinck Copper & Lead It corrodes Iron & extracts an emetic Quality from Antimony without however diminishing its substance in any perceptible Degree so that an Ounce would serve a Practitioner his whole Life to prepare from. no wonder the Chemists have not been able to distinguish this subtile Substance or whether it is lodged in the entire Metal. ——

Tho the other Metals are not soluble in the veg: Acid in their solid State yet when previously diſsolved

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Tho the other Metals are not soluble in the veg: Acid in their solid State yet when previously dissolved in other Acid & then precipitated by a fixt Alk: they become sometimes soluble in it sometimes when calcined they are acted on by it & Mercury is so when reduced to Powder by Trituration

4 Earths

It unites with all the absorbents but as it acts more strongly on some than others this teaches us to make use of the strongest for the purposes of Medicine The Earth of Alumn & Animal Earths would be of very little service in absorbing the acid of the Stomach

5 Watery Bodies

When highly concentrated it generates some Degree of Heat with Water

6 Aerial Bodies

As the different Acids act in absorbing moisture from the Air in

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ation this acid has very little [illegible]
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Animal & veget substances
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[illegible] Bridge

[illegible] from the [illegible]

proportion to their degree of Concentration this acid has very little effect on it. —

Animal & veget: Substances.

It acts in some degree but has little Power in corroding them is therefore perhaps a safer tho not so powerful an antiseptic as the other acids.

Its different Names.

We have ranked em under one general Head tho their different names would seem to express a real Difference & this is not indeed properly ascertained For regenerate Tartar is decomposed by Vinegar which shews a different Force of Attraction.—

– Having thus taken a general View of the four Species of acids we will take a view of their Properties in order to see what Grounds the Chemists have for the Opinion they have entertained that there is but one Original Primogenial Acid & also to fix a more just Idea of the Nature of Acids than our imperfect Definition at first laid down could convey.

Of Acids in General.

α 1- Fluidity - We find all acids affect a fluid State more than Water even vegetable acid itself yet all of them may by a certain degree of Cold be rendered solid. They resist the action of Cold (considered each by themselves) in proportion as they are more concentrated.

But when we compare them together we do not find that they resist Cold in proportion to their Degree of Concentration they are capable of. For tho the vitr: acid can be brought to a greater degree of concentration. Then the Ordinary [illegible]

it is more easily got in [illegible]

they arrange to find the [illegible]

[illegible] by the Action of [illegible]

Principles as to render the [illegible]

equal to the water then [illegible]

When on the contrary [illegible]

are more easily dissolved [illegible]

[illegible] as they contain more [illegible]

Precipitate.

They are all insoluble [illegible]

[illegible] in [illegible]

degree of concentration.

Gum.

Then there are of different kinds

but they are common [illegible]

all in the same and [illegible]

[illegible] according to the different

manner of Preparation & in the

that there is but one Original Primogenial Acid & also to fix a more just Idea of the Nature of Acids than our imperfect Definition at first laid down could convey. ——

Of Acids in General. —

α 1- Fluidity – We find all acids affect a fluid State more than Water even vegetable acid itself yet all of them may by a certain degree of Cold be rendered solid. They resist the action of Cold (considered each by themselves) in proportion as they are more concentrated. ——

But when we compare them together we do not find that they resist Cold in proportion to their Degree of Concentration they are capable of. For tho the vitr: acid can be brought to a greater degree of concentration. Than the [illegible]

[illegible] is more easily got [illegible]

by [illegible] & find the [illegible]

[illegible] by the Nature of [illegible]

Principles as the acids

of acid to the water [illegible]

them in the condens[illegible]

are more easily dispersed

mixture as they condense [illegible]

[illegible]

They are all [illegible]

There is more or less [illegible]

degree of the [illegible]

[illegible]

The they are of [illegible]

[illegible] that are [illegible]

of as the same [illegible]

[illegible]

[illegible] of [illegible]

found there is but one Passage at the [illegible] [illegible] & altho' [illegible] [illegible] [illegible] [illegible] Top of the Pastern [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible] [illegible]

Of Birds in general

[illegible] [illegible] [illegible] [illegible] [illegible] a [illegible] [illegible] more than [illegible] [illegible] [illegible] and [illegible] [illegible] [illegible] may by a certain Degree of [illegible] [illegible] and [illegible] They exceed the [illegible] of the [illegible] [illegible] by [illegible] [illegible] [illegible] as they are more [illegible] [illegible]

[illegible] [illegible]

Concentration than the Nitrous yet it is more easily got in a solid Form It is strange to find the Chemists so misled by the Notion of Hypostatical Principles as to ascribe the Fluidity of acids to the water they contain When on the contrary we find they are more easily deprived of it in proportion as they contain more Water.—

2— Their Specific Gravity—

They are all specifically heavier than Water & more so in proportion to their Degree of Concentration.—

3— Colour.

Tho they are of different Colours in the State we commonly have them yet as the same acid assumes difft Colours according to the different manner of Preparation & as they are often quite colourless we have reason to think that as acids they are void of Colour.

4 Odour.

The variety we observe among them with regard to this seems also owing to some extraneous matter for water deprives them of it probably owing to its disengaging that Matter Volatile vit: Acid evidently owes its Odour to some heterogeneous matter.

5 Taste

Tho' in each acid we may observe a peculiar Taste different from what is acid or yet they lose that in proport= as they become concentrated so that as Acids they dont seem to have any Difference in this respect.

If we now take a view of their Effects

[illegible]

[illegible]

[illegible] of [illegible]

[illegible] Bill

The preceding [illegible] among them

[illegible]

[illegible]

[illegible] of the [illegible]

[illegible]

[illegible]

[illegible]

A Bill

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

on other Bodies we shall find that these are generally common to them all. —

x — They all unite with Alkalies with the same general Phænomena viz: Effervescence Heat & the production of a neutral Body The Difference that occurs with respect to Effervescence seems to occur from a difference of the Alkalies more than in the Acids as we shall see when we come to treat of Alkalies. —

It was formerly thought that they generate cold with the vol: alkali. But this is only when they are more dilute & it is merely owing to the Cold generated with it by the water they contain counterbalancing the Heat which they themselves produce. —

For the three first acids always excite heat when concentrated with the vol: alkali & veg: Alkali does not only because it can never be got sufficiently concentrated. The Quantities of these necessary to saturate the same quantity of fixt alkali varies greatly according to Homberg's Experiments. And tho he is the only Person who has attempted to determine this yet he is a man of such accuracy that we cannot question his Facts but we must not on that acct admit of his conclusions. — For because that he found that his ℥i of fixt Alk: had only ʒiii added to its weight by being saturated with any of the four acids he inferred that the ʒv of vit: Acid the ʒx of nitrous the ʒxxi of muriatic & the ℥xiv of vegetable necessary for that Purpose contained each only ʒiii of real Acid. Now it is certain that in the formation of neutral Salts in this manner there is part of the muriatic acid dissipated viz its fixt Air which

[illegible] were not acquainted with [illegible]
[illegible] knowledge of all [illegible] that the
[illegible] of [illegible] were [illegible]
[illegible] those [illegible]
[illegible] understand the [illegible]
of [illegible] to [illegible] or a [illegible]
[illegible]
[illegible] in a [illegible]
[illegible] on the [illegible] of [illegible] but [illegible]
[illegible] of that with [illegible]
[illegible] the same [illegible]
[illegible] of [illegible] to [illegible] the [illegible]
[illegible]

The [illegible] to [illegible]
[illegible] and [illegible] to [illegible]
[illegible] but [illegible]
[illegible] of [illegible]
[illegible]
[illegible] they [illegible]
[illegible]

[illegible]

[illegible] the Republic of those [illegible]

[illegible]

[illegible]

[illegible]

Persons who have attempted to [illegible]

[illegible]

[illegible] that we cannot [illegible]

[illegible]

[illegible] of the [illegible]

[illegible]

[illegible]

[illegible] of the [illegible]

[illegible]

[illegible] the Laws of probability [illegible]

[illegible]

[illegible]

[illegible]

[illegible] formation of [illegible]

[illegible] parts of the [illegible]

[illegible]

Homberg was not acquainted with & besides in the Chrystals of all neutral Salts there is a Quantity of Water now without taking both these facts into Consideration we can never determine the proportion of acid & alkali in a neutral. We have an instance too where an acid saturates more alkali in a dilute State viz: in the case of vol: Vit: Acid. For five drachms of that will saturate more fixt alkali than the same quantity of fixt vit acid & yet the last evidently contains more acid.

2— The nitrous & vit: acids unite with Oils attended with heat & Effervescence & we must conclude that the other two do not on account merely of their Water since the two first scarce act upon them we may therefore say that it is the Nature of acids to unite with Oils.

In the same way we may say it is the nature of acids to unite with Alcohols since the two first join it & diſsappear entirely producing at the same Time a great Change in the Alcohol & the marine acid has this Effect in some measure

- None of the acids unite with Sulphur because we may consider that as saturated with them already. ——

γ There are no Metallic Substances but what unite with some of them & the more concentrated the easier they unite

δ With regard to absorbent earths their union is more general for each of the acids unite with all the different kinds of them ——

ε They all unite with water - But their effects are not in proportion to their concentration for the nitrous acid generates more cold with Ice than the vitriolic does. —— —— ——

ζ They all attract Water from the Atmosp

[illegible]
[illegible]
[illegible]
[illegible]
[illegible] the Sulphur of the [illegible]
[illegible]

[illegible] of [illegible]
[illegible]
[illegible]

[illegible] the [illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible] with the different kind
of [illegible]

Another

[illegible]
[illegible]
[illegible]
[illegible]
[illegible]

[illegible]

=here. Qu: is this Water diffused dissolved or mixt with it? ———

It is the property of acids to unite wi the animal or vegetable Substances whether it is the whole Compound or only some of its Parts we cannot determine If in par only it is comprehended under some of the Cases already mentioned I believe we may say that acids in general have this Prop=erty for the Veget: Acid seems to want this power only because it is dilute. ———

With regard to the Characteristic we were at first obliged to give of acids viz that they change the Syrup of Violets to a red colour we must now take notice that this is not applicable to every Circumstance of the Acids They indeed universally change the Colour of vegetable Jui=ces whatever they be but a concentrated Acid turns the Leaf of a Violet black & the Colour is always dark in proportion to their degree of Concentration. ———

Finally it is the common Property of all Acids to check the Fermentation.——

By what has been now delivered concerning the Property of Acids in general the Deficiency of our first definition is sufficiently obviated. And I think the existence of a fundamental Acid is rendered extremely probable.——

To what kind of extraneous matter shall we then ascribe the differences among the Acids?——

We have been so little accustomed to the farther resolution of those bodies which have been commonly reckoned simple that nothing but what is merely conjectural can be said on this Subject.

Homberg says it is a Sulphur or Phlogiston which is of different Kinds in different acids. That in the vit: Acid is a bituminous Sulphur that in the muriatic a metallic Sulphur & in the

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible] the Representatives [illegible]

[illegible]

[illegible]

[illegible]

[illegible]

The [illegible] roll of Members present [illegible]

[illegible]

[illegible]

[illegible]

[illegible] [illegible] the commencement [illegible]
[illegible] to [illegible] the [illegible]
[illegible] [illegible] been [illegible] [illegible] [illegible]
[illegible] the [illegible] of [illegible] in [illegible]
the Experience of [illegible] [illegible] [illegible]
at imprudently [illegible] [illegible] [illegible]
the [illegible] of a [illegible]
[illegible] [illegible] [illegible] [illegible]
[illegible] [illegible] of [illegible] [illegible]
[illegible] [illegible] [illegible] the [illegible]
[illegible]
[illegible] [illegible] [illegible] [illegible] [illegible]
[illegible] [illegible] of [illegible] [illegible] [illegible]
[illegible] [illegible] [illegible]
[illegible] [illegible] [illegible] [illegible] [illegible]
[illegible] [illegible] [illegible] [illegible] [illegible]
[illegible] [illegible] [illegible] [illegible] [illegible]
[illegible] [illegible] [illegible] [illegible] [illegible]
[illegible] [illegible] [illegible] [illegible]
[illegible] [illegible] [illegible] [illegible]

nitrous or Vegetable acids an animal or vegetable Sulphur For my part I am inclined to attribute these varieties to the presence of mephitic Air which indeed the Chemists have often meant by Sulphur or Phlogiston.

Before we leave this Set of Saline Substances a Question occurs Whether there are any other kinds of Acids than the four already treated of?

1 Phosphorus or the salts of urine yeild an acid

2 The sedative salt of Homberg procured from Borax is now found to be of an acid nature

3 Common or white arsenic seems to have a peculiar Acid.

4 What is called Salt of Amber is now ascertained to be an acid.

5 In the distillation of animal Substances there is an acid got differing considerably from the acids of Urine & Phosphorus.

6.— There is an acid produced from ants by Expreſsion of which animal it is observed that by creeping over a purple flower they change it Colour to red.—

But the Chemists have endeavoured to reduce all these to the four first Species The acids No 4-5-6 are easily affirmed to be vegetable & the acid of arsenic to be muriatic But the two first differ so remarkably from all the rest that we must consider them as distinct Species They will however again occur when we come to the substances from whence they are taken.

Of Alkalies.

The number of these are much better ascertained than that of acids Of the three ~~the~~ Foſsile only is native & on that Account it might be expected we should begin with it but as it is but lately

[illegible]

to the Northward [illegible]

[illegible]

Summer they return to the Southward [illegible]

[illegible] the [illegible]

[illegible] with them In the first place

[illegible]

[illegible] by the [illegible] of [illegible]

[illegible] But the [illegible]

[illegible]

[illegible]

[illegible]

[illegible] the [illegible] from [illegible]

[illegible]

Of Whales

The [illegible] of these are [illegible]

[illegible] than that of [illegible] of the

[illegible] the Fish [illegible]

[illegible]

[illegible]

known & as we have a more compleat History of the veg: Alkali we rather chuse to treat first of it But before we enter on any of them there is a variety which takes place equally in them all to be observed & explained.

Of the Effervescent and non effervescent State of Alkalies

One of the Characteristics we give of Alkalies is that of Effervescence with acids but this is far from being general We may have them in a state in which no effervescence will ensue on their union & yet that Union be as perfect as if there had This effervescent State then is not essential to Alkalies & is evidently owing to the presence of Air in them since we see this rising in Bubbles & extricating itself during the Effervescence This Air however differs from that of the Atmosphere for we may expose an Alkali to it for a considerable Time before it becomes effervescent tho it does so at last because it is probably contained in the Atmosphere. The fixt alk: has a stronger Power of attracting Air than the volatile Hence by mixing these together (The volatile being in an effervescent State & the fixt non effervescent) a change of these properties is produced We can again transpose the air to the volat: alk: by having two Phials communicating by a Glass Tube luted to them in one of which the Effervescent Alk: is contained and in the other the non-effervescent & then pouring in an acid on the fixt Alk thro a hole which is immediately closed with Lute the Air is set at liberty by the Acid & rises along the Tube to the other Phial where it joins the vol: Alk: which will be now found to effervesce with an Acid – Calcarious Earths when calcined lose their property of effervescing with Acids and in that State attract the Air we

[illegible] [illegible] from spreading of [illegible] [illegible]
through these Alkalies by [illegible] [illegible]
[illegible] [illegible] them [illegible] [illegible]
effervescent. These Powders [illegible] [illegible]
[illegible] [illegible] [illegible] to be of the same [illegible]
with that which arises from Calcareous
[illegible] with Effervescent Alkalies [illegible]
[illegible] than the effervescent [illegible]
[illegible] animal Substances they are called
[illegible] [illegible] the effervescent [illegible]

Of the first [illegible] Blood

[illegible] the natural History

The most first [illegible] [illegible] [illegible]
[illegible] [illegible] [illegible] [illegible]
[illegible] with other Bodies [illegible]
[illegible] [illegible] [illegible] [illegible]
[illegible] [illegible] in the Form of a [illegible]
[illegible] [illegible] that there are [illegible]
[illegible] [illegible] [illegible] by [illegible]
[illegible] [illegible] [illegible] [illegible]
[illegible] [illegible] [illegible] of [illegible]

we have been speaking of more ~~more~~ strongly than Alkalies & of Consequence by being added to them render them non effervescent.— This Air I would call Mephitic as it seems to be of the same kind with that which issues from Volcano's.— —As the non-Effervescent Alkalies act more powerfully than the effervescent in corroding animal Substances they are called Caustic & the effervescent mild.—

Of the fixt veg: Alkali.—

I Its natural History

The veget: fixt Alk: does not appear to be a native Substance either pure or united with other Bodies Some Facts indeed have been alledged in Proof of its existing in the Form of a neutral Salt in Vegetables but these are far from being conclusive & there is great reason to believe it is produced in them by the action of the Fire

It is never found in any Animal Substance. ——————

II The manner of procuring it

The first Alkali is always produced by the action of the Fire. ——————

α From all Veget: Substances I believe in their recent entire State ——————

β From certain vegetable matters produced by vinous fermentation as the Lees of wine Tartar & even vinegar at least its residuum when the distillation of it is pushed to a great Length

γ From Nitre. ——————

The first way of getting it is seldom practised by the private Chemist but is an art of so much importance that I have been in use of giving a particular account of it. In my late Attempts however to establish this Manufacture I have met with so many doubts about

the proportion [illegible] of [illegible]
[illegible]
[illegible]
[illegible]

[illegible]
[illegible]
[illegible]
[illegible] of the [illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]
[illegible]

The Receiver General then [illegible] the amount
to Government.

2. The manner of [illegible]
the Post Office [illegible] a [illegible]
to the [illegible] of the [illegible]
Post and Penny Post [illegible]
in [illegible] Books.

[illegible] [illegible] [illegible] [illegible]
[illegible] the [illegible] [illegible] [illegible]
[illegible] of [illegible] [illegible] by [illegible] [illegible]
[illegible] [illegible] the [illegible] [illegible] the [illegible]
[illegible] by it as [illegible] to [illegible]
[illegible] Books.

The first [illegible] of [illegible] is [illegible]
[illegible] by the [illegible] [illegible]
[illegible] [illegible] of [illegible] [illegible]
[illegible] in [illegible] of [illegible] [illegible]
[illegible] [illegible] [illegible] [illegible]
[illegible] to [illegible] the [illegible]
[illegible] [illegible] [illegible]

the properest manner of performing it that I find I can deliver nothing certain upon the Subject & am therefore willing to paſs over it. ——

The German or pearl-ashes (so called from their pearl colour) which are a veg: fixt Alkali procured from wood are fit for most of the purposes of the Elaboratory & they can be perfectly purified by diſsolving them filtrating & evaporating the Solution & then setting the Salt to fuse on the Fire for an Hour.—

The Pearl-Ashes are in my opinion a purer alkali than what are commonly sold by Trading Chemists in England viz: Salt of wormwood &c & are to be had at a much leſs expence. They both contain a portion of neutral Salt but the Pearl ashes are freest from it & I cannot help giving them the Preference on the same account to the veg: fixt Alk obtained by Tachenius method tho so much recommended by Boerhaave & other Chemists. ——

2 The veg: fixt Alkali is procured in greater Quantity & freer from neutral salt from Tartar than from any other veg: Substance. All other veg: Substances when treated in close veſsels give out no fixt alk: at all whereas Tartar or Wine lees do.— They indeed appear in a black maſs like Charcoal but by Lixiviation Filtration & Evaporation we then get the alkali quite pure.—

NB Linnen is the proper filter as the fixt alkali will diſsolve Paper or Woolen. ——

For the purposes of the private Chemist Tartar may be calcined in a Crucible. ——

3 The fixt veget: Alk: is procured from

[illegible] by the action of any [illegible]
[illegible] atmospheric [illegible] This the [illegible]
[illegible]
[illegible] or any other inflammable [illegible]
[illegible]
[illegible] and from the [illegible]
[illegible] other

[illegible] following [illegible]
[illegible] and the [illegible]
[illegible]
[illegible]
[illegible]

[illegible] the same [illegible]
[illegible]
[illegible]
[illegible] a portion of [illegible]
[illegible]
[illegible] the [illegible]
[illegible] the whole [illegible]
[illegible]
[illegible] Portion of [illegible]
[illegible]

[illegible] the same accounted for the profit
obtained by Exchanging [illegible] the
[illegible] ascertained by Exchanging [illegible]
Example.

[illegible] find [illegible] [illegible]
[illegible] [illegible] [illegible] [illegible]
[illegible] [illegible] than [illegible] [illegible]
[illegible] [illegible] All other [illegible]
[illegible] [illegible] [illegible] [illegible]
[illegible] [illegible] [illegible] [illegible]
[illegible] [illegible] They indeed [illegible]
[illegible] [illegible] [illegible] [illegible] [illegible]
[illegible] [illegible] [illegible] [illegible]
[illegible] the [illegible] [illegible]
[illegible] [illegible] the [illegible] [illegible]
[illegible] [illegible] [illegible] [illegible]
[illegible]
For the [illegible] of the [illegible]
[illegible] [illegible] [illegible] [illegible]
[illegible]

[illegible] [illegible] [illegible] [illegible]

Nitre by the addition of any body which will dissipate its acid. This the Phlogiston does & so by deflagrating Nitre with Charcoal or any other inflammable Substance except Sulphur (because there the nit Acid would join the fixt Alk:) we get the veg: alkali ———

By calcining Metallic Substances with Nitre we also get the fixt Alk: but then the Calx of the metal is along with it & that is in some measure joined with the nitrous acid. ———

For the same Purpose Charcoal is very commonly used because it not only affords a Phlogiston to dissipate the nit: acid but also yeilds a portion of Alkali itself When the Nitre & Tartar are added in equal Quantities the Alkali procured is called the White Flux being much used in fluxing Metals & when we use a double Portion of Tartar in which Case there is more Phlogiston than is necessary to dissipate the acid it is called the black Flux from the black Colour which it receives from the Phlogiston it retains.— This still more used in Fusion. In making a white Flux a crucible is made red Hot by the mixture of the nitre & Tartar thrown in by Spoonfuls that the Inflammation may be quite complete & the whole Phlogiston be dissipated wh=ereas in making the Black Flux it is put all at once into the cold crucible & the Deflagration made by a piece of Charcoal because here part of the Phlogiston must be retained.— In none of these Operations is the vegetable Alkali got either quite mild or quite caustic but the more compleat the inflammation has been the more caustic the Salt will be & vice versa. The mark of perfect

x Some bodies in burning give out their air which the alk. absorbs. & becomes mild as is the case in making Prussian Blue.

Causticity is very evident but there is no other way of knowing when an Alkali is perfectly mild but by chrystallizing it for if it is in the least caustic it will then run per deliquium which it never does when in a mild State. ——

It may be rendered mild.

—By exposing it to the Air spread out pretty thin for it first melts per deliq: but by degrees attracting Mephitic Air from the Atmosphere and having got as much water as is necessary for its chrystalline Form it again becomes solid & at the same Time mild. ——

+By joining it with the vol: Alk: from which it attracts mephitic Air. ——

By holding it over fermenting Liquors from which the Acidum fermentans of Boerhaave the mephitic air is exhaling

It may be rendered caustic

1 In a great measure by Calcination but before it becomes entirely so it would run thro the Veſsels & uniting with their Substance turn them into Glaſs. —

2 By the addition of calcined calcarious Earths which when deprived of their Mephitic Air attract that of the veget: fixt Alkali more strongly than the Alk: does itself. ——

This cannot be done in the way of Cementation conveniently because the Earth loses the air again immediately by the force of the Fire which it had attracted & runs into a Glaſsy maſs with the Alkali The best method is to diſsolve the Alkali in water & then add three times its weight of Quick-Lime having made the Solution only in as much water as is to

The fixt alk: contained in Neutral Salts is in its caustic State -

The Quick lime here by attracting ye fixt Air from the Alk. becomes mild itself

suspend the Quick-Lime in the consistence of a Poultice because then it is not so apt to subside After stirring the Quick-Lime sometime we wash out the Alkali with more Water & then try if it effervesces with an Acid If it does not the Alkali is perfectly caustic if it does we must repeat the operation with more of the Quick-Lime. In Sweden & Russia they use the Earth got along with the alkali itself instead of quicklime.—

3 - All metallic substances when reduced to calces have the same effect of rendering the fixt veg: Alk: caustic If they do this by absorbing the mephitic air is uncertain But it is rendered probable by this that metals can be reduced to their malleable State by calcareous Earths which would seem to be in consequence of attracting their mephitic Air.

Having rendered the Alkali caustic

it is exceedingly difficult to get it in a solid Form for the purposes of surgery since there are no vessels but those of Gold or Silver which it will not pervade before that & even in these it attracts mephitic Air during the Evaporation The way I would advise is to evaporate till a Film of Chrystal appears above & then add powdered quicklime till it it is of a proper consistence. ——

III. The Chemical Properties of Veg: Alkali

Its properties considered by itself.——

1 Taste it has a peculiar Taste more or less acrid according to its more or less Causticity. It is often described as of an urinous Taste or that of the vol: Alk. But tho such a sensation is excited when applied to the Tongue it does not arise from it but from an Ammoniacal Salt contained in the Saliva which is

[illegible]

III. The Chemical Properties of the Blood [illegible] considered by itself.

[illegible]

decomposed by it. ——

Colour. — taken pure the veg: fixt Alk: is of a snow white & the blue or green Colour which is intermixt in the pearl Ashes is owing probably to some adhering Phlogiston however it is so little as not in the least to affect the other Qualities of the Alkali. ——

Odour. — It is perfectly inodorous. ——

Consistence. — It is easily procured in a dry & solid form but has been commonly said not to concrete into regular Chrystals This however it does when perfectly mild in which State it is not in the least deliquescent a property which has also been commonly ascribed to it

Of its properties with regard to other Bodies. — And 1^{stly} as to the other saline Substances

It will not unite with the Foſsile Alk: tho they so much resemble each other a Fact which shews the Fallacy of Mr Macquers rule that similar Bodies are most disposed to unite.

β It unites with acids of all kinds forming the neutral Salts with them as we have already mentioned. It attracts acids more strongly than the volatile Alkali, metals- or earths The fossil Alkali & it seem to have the same Force of Attracⁿ

2 Inflammable Bodies.

α ~~1~~ It unites with Oils of all kinds forming a compound with them called Soap which is soluble in Oil Water & Ardent spirits I believe this Union is confined to the Caustic State of the Veg. Alkali & this seems to be the Foundation of the Practice of joining Quick-Lime to it before we make Soap.

β It only unites with ardent Spirits also in its caustic State & when they are perfectly free from Water. The Tinctura

[illegible] of the Persons of such a Dispo-
sition of Affection this Person with the [illegible]
[illegible] be [illegible] or [illegible] the [illegible] of
[illegible] [illegible] a Weakness of Mind [illegible]
[illegible] are [illegible] [illegible]

The very first [illegible] [illegible] with [illegible]
[illegible] of a Person [illegible] [illegible]
[illegible] [illegible] [illegible] the Meaning
the [illegible] a [illegible] [illegible]
[illegible] [illegible] for the [illegible]
[illegible] [illegible] [illegible] [illegible]
[illegible] [illegible] Person [illegible]
[illegible] [illegible] [illegible] [illegible]
[illegible]

[illegible]

[illegible] [illegible] the [illegible]
[illegible] [illegible] [illegible] the [illegible]
[illegible] [illegible] [illegible] the [illegible]
[illegible] [illegible] [illegible]
[illegible] [illegible] [illegible] [illegible]
[illegible] [illegible] [illegible]

[illegible] [illegible] [illegible] the [illegible] of the

Circumference to the Mean Diameter [illegible]

[illegible] [illegible] by [illegible].

B. [illegible] [illegible] [illegible] of each [illegible] from
[illegible] the [illegible] [illegible] [illegible] [illegible]
[illegible] [illegible] [illegible] [illegible] [illegible]
[illegible] [illegible] [illegible] the [illegible]
[illegible] [illegible] [illegible] the [illegible] [illegible]
[illegible] [illegible] [illegible] the [illegible] [illegible] of [illegible]

2. Difference in the [illegible]

x [illegible] [illegible] the [illegible] of each [illegible]
[illegible] [illegible] [illegible] [illegible] [illegible]
[illegible] [illegible] [illegible] in the [illegible]
[illegible] [illegible] [illegible] [illegible] [illegible]
[illegible] [illegible] the [illegible] [illegible] of the
[illegible] [illegible] [illegible] [illegible] the [illegible]
the [illegible] of [illegible] [illegible]
[illegible] [illegible] [illegible] [illegible]

Helmontii Salis Tartari is only a different way of affecting this Union with the Caustic Alkali & what is called the Harveian Tincture is really a Tincture of Hepar Sulph: which we are going to mention. ———

The veg fixt Alk: unites with Sulphur & forms with it a Hepar Sulphuris which is decomposed by all the acids. & during the precipitation a very dissagreeable odour arises which ought to be particularly attended to as it forms a mark to know when Hepar Sulph: is formed on some occasions when we could not otherwise perceive it. ———

3 Metallic Bodies. ———

The veg: fixt Alk: in the way of common Solution unites with Copper & Lead, how far it does so with the other metals I know not but it certainly acts on them in Precipitation when too great a Quantity is added as we observed when on that Subject It promotes the Fusion of metals greatly & unites with them also in that way.

4 - Earths.

In the way of Solution it diſsolves some Animal Earths as the Calculus of Urine & in Fusion it joins all the pure Earths & forms Glaſs with them Common Glaſs is made of it & Chrystalline Earths.

5 Water.

It diſsolves in this like the neutral Salts & the more caustic it is with the greater Ease & the greater degree of Heat.[x] Tho of a fixed nature when diſsolved in water & raised to a boiling Heat part of it flies off which affords us a Leſson with respect to the Evaporation of it There is also a decomposition of it takes place part of it being converted into an Earth.

+ When perfectly mild it generates Cold with Water

[illegible] [illegible] [illegible] [illegible]
Persons of [illegible] [illegible] in [illegible]
[illegible] also in [illegible] way.

[illegible] Extent

In the [illegible] of [illegible] in [illegible]
[illegible] Extent in the Extention of these
to the Persons [illegible] [illegible] all the [illegible]
[illegible] [illegible] with them [illegible]
[illegible] [illegible] by [illegible] [illegible]

5 [illegible]

[illegible] in [illegible] [illegible] the [illegible]
[illegible] [illegible] [illegible] [illegible]
x [illegible]
[illegible] [illegible] [illegible] [illegible]
[illegible] [illegible] [illegible] [illegible]
[illegible] [illegible] [illegible] [illegible]
[illegible] [illegible] to the [illegible]
[illegible] of [illegible] [illegible]
[illegible] [illegible] [illegible] [illegible]
[illegible] [illegible] in [illegible]

When Caustic it separates Water from Alcohol by elective Attraction & hence gives us the means of rectifying it. ——

6 Animal Substances. —

The Caustic veg: fixt Alk: diſsolves all animal Substances at least we must not be rash in admitting exceptions to this since it has been known in its perfectly caustic state so lately that it is probable such experiments as seem to contradict this have not been made with it in that State. ——

7. Vegetable Substances

The caustic Alk: likewise diſsolves vegetable but not so readily as animal Substances & when applied to those of a solid Texture it first diſsolves their unctious mucilaginous parts without destroying their Structure & hence it is used in Bleaching as the Colour of the Fibres of Flax is in this manner extracted by it without being broke.——

It checks fermentations of all kinds being now found to be even *antiseptic* contrary to what was long thought.

Its different names α

1 *Cineres Clavellati.* is a general name for it when got from recent Vegetables.—

× 2 *Pearl or German Ashes.* (so called from their being of a faint pearl-Colour) are the fixt veg: Alkali prepared & purified in Germany.——

b 3 *Pot-ashes* This name is applied to that which is got from Ruſsia & Sweden These are of a more caustic nature than the former & contain a great Quantity of the Earth of the Alkali which is added in these Countries for the purpose of making it caustic.——

+ 4 *Cendres Gravellees.*- This is the name given by the French to what is got

+ probably by attracting the Attracting ye Acid necessary in such

α Perhaps Sal Alk: fixus woud be least liable to Objection

(a) from Clavicula or Claspers of Vines as it was at first got from these by Incineration.

+ these are nearly mild

(b) from the Iron Pot used in the Incineration

+ from a corruption of *clavellati* before mentd fixed nitre

+ This contains more Phlogiston than fixed Nitre as $^{+}$it will not make a Pulv. fulm. as Salt of Tartar will. this is not ye reason. fixd nitre is gen'l more caustic.

from Wine-Lees.

5 Salt of Tartar+ This is what is got from Tartar tho' I believe what is commonly sold under this name is a weed ash & not procured from so expensive a Substance.

6. Fixed Nitre When got from Nitre.

7. Alkahest Glauberi so called also when got from Nitre because Glauber imagined it then to be an Alkahest or universal Solvent.

8. Reguline Caustic so called when rendered caustic by Reg. of Antimony by a process described by Hoffman in his Observ. Chemicæ.

9. Alkahest of Respour when rendered caustic by means of Zinck because Respour an old Chemist imagined it was then an Alkahest. or general Menstruum

10 Lapis Septicus
11 ——— Infernalis
12 Cauterium potentiale
13 Causticum Commune.

Names given it in Surgery

Of the Fossile Alkali.—

I Its Natural History.

In Africa & Asia this is found in the Earth both pure & joined with other Bodies Particularly near Ephesus & Smyrna I have also seen specimens of it in this Country Common Salt contains it wherever it is found & Glaubers Salt if the true Glaubers Salt be ever native.

Tho the Chemists formerly imagined that mineral waters were always impregnated with acids Yet Stahl & Hoffmann have shown that they contain

[illegible] [illegible] [illegible] [illegible] The Pagoda [illegible]
The Hall [illegible] be [illegible] than a [illegible]
[illegible] whole [illegible] of the [illegible] of the
[illegible] [illegible] [illegible] to the [illegible]
[illegible] [illegible] as [illegible]
The whole [illegible] is [illegible] [illegible]
[illegible] which consists of [illegible] the [illegible]
[illegible] walk of [illegible].
[illegible] [illegible] the [illegible] to have been
[illegible] to the ancient [illegible] [illegible]
[illegible] the name of [illegible] [illegible]
being mentioned by [illegible] [illegible]
[illegible] in a manner that [illegible]
[illegible] the [illegible] the [illegible] [illegible]
[illegible] of [illegible] [illegible]
[illegible] [illegible] of [illegible] [illegible]
[illegible] [illegible] [illegible]
[illegible] [illegible] [illegible]
[illegible] [illegible] of [illegible]

[illegible] [illegible] [illegible] [illegible]

[illegible] [illegible]

[illegible] [illegible] [illegible] [illegible]

[illegible] [illegible] [illegible] [illegible]

of the Fifth Article

a Natural History

The Species of Bees that is found in

the [illegible] [illegible] [illegible] [illegible] [illegible]

the [illegible] [illegible] near [illegible]

[illegible] [illegible] [illegible] [illegible]

[illegible] on the [illegible] Common [illegible]

[illegible] [illegible] [illegible] [illegible] found by [illegible]

[illegible] the [illegible] [illegible] [illegible] [illegible]

[illegible]

[illegible] [illegible] [illegible] [illegible]

[illegible] [illegible] [illegible] [illegible]

[illegible] [illegible] [illegible] [illegible]

[illegible] [illegible] [illegible] [illegible]

often an Alkali viz: The Foſsile. For tho Thill chuses to reckon this a particular Alkali & gives it the name of Sal Cryptium there seems to be no foundation for such an Opinion.

The foſsile Alkali is also found in Borax which consists of it & the sedative salt of Homberg.

The foſsile Alk: seems to have been known to the ancient Greeks & Romans under the name of Nitrum or Natrum being mentioned by Plato & by Pliny in such a manner that we must allow he means this Alkali & as the Incineration of maritime Plants was first practised it is probable the name Alkali was first applied to it. but as that Practice was afterwards transferrd to the inland countries of Europe the term was also transferred to the veget: Alkali & it was thought to be the only one in Nature. Boyle was the first who took notice of this among the Moderns as being a distinct Species & after him Staahl in his Specimen Beekerianum But even after them it was neglected till within these 30 Years Du Hamel published a Treatise on it under the Name of the Basis of Sea-Salt. Pott after this continued in Doubt of its being an Alkali but now I think every Body allows it. ——————————

II The way we procure it —

1.- All the Plants that grow in Salt Water take in a considerable Quantity of common Salt along with the the Water which nourishes them & we get the Fossil Alkali by the Incineration of such maritime Plants

[illegible] in [illegible] of the voyage
and being prepared [illegible] the [illegible]
[illegible] in [illegible] on the [illegible]
Whole crew [illegible] [illegible] [illegible]
the [illegible] [illegible] of the
[illegible] in [illegible] [illegible] [illegible]
All produced in the [illegible]
[illegible] [illegible] [illegible] in [illegible] [illegible]
[illegible] according to [illegible] [illegible]
[illegible] [illegible] [illegible] [illegible] [illegible]
[illegible] from the [illegible] of [illegible]
by [illegible] the [illegible] of [illegible] [illegible]
[illegible] and where the [illegible] [illegible]
[illegible] [illegible] the [illegible] [illegible]
[illegible] [illegible] than [illegible] [illegible] of the
[illegible] [illegible] [illegible]
[illegible] [illegible] [illegible] [illegible] [illegible]
[illegible] [illegible] [illegible]
[illegible] [illegible] [illegible]
[illegible]

[illegible] have [illegible] transferred to the Royal [illegible] by which means [illegible] thought to be [illegible] [illegible] in [illegible] Royall and the proof [illegible] [illegible] of their money [illegible] [illegible] a Particular Grievance to [illegible] [illegible] in the [illegible] [illegible] [illegible] after them [illegible] [illegible] above 50 years the [illegible] [illegible] a Treaty [illegible] Power of the Bank of [illegible] [illegible] [illegible] in [illegible] having an Estate [illegible] [illegible]

[illegible] the way we [illegible]

[illegible] the [illegible] [illegible] [illegible] [illegible] of [illegible] [illegible] [illegible] [illegible] in [illegible] the Royal [illegible] probably in consequence of the muriatic acid being expelled by the Phlogiston tho indeed we cannot get the foſsil Alkali pure from common Salt itself in this manner tho it admits of Inflammation in some degree with Charcoal The Alk: produced in this manner from maritime Plants is more or leſs pure according to ye Countrys in which it is prepared. That which comes from the Levant is purest of any & on the Coast of Spain viz: at Alicant where they sow a weed on purpose near the Sea they make it much purer than we because we use all sea Plants promiscuously. However the best that is any where prepared is very impure containing Hepar Sulphuris Magnesia Glauber's Salt Earth half vitrified (which gives it a hard consistence) & a great Quantity of common Salt. In order to free it of these heterogeneous matters we must reduce it to a Powder & then pour Water on this to make a Lixivium This Lixivium is to be treated in the same way as we directed with regard to the separation of Nitre from common Salt by a Process described by Boyle Stahl & since by Du Hamel (who imagined it a new practice.) It is shortly this.– To common Salt add a Quantity of nitrous Acid which will expell the muriatic & this will come ov by distillation. In the Retort we shall have a cubic Nitre which has the same Properties as Common Nitre of deflagrating with Charcoal & having its Acid dissipated so that by such Deflagration we can get the Fossile Alkali This method is very troublesome because it

requires a great deal of nitrous Acid to expell all the muriatic & we must accordingly add a fresh Quantity of it & repeat the Distillation twice or thrice before it be perfectly done. There is always some of the nitrous acid comes over with the muriatic so that what we have in the receiver is an Aq: Regia

3. – We may get the fossile Alkali still another way viz by adding an inflammable Matter to Glaubers Salt so as to form a Hepar Sulphuris which being decomposed by Nit: Acid gives us a cubic Nitre & this we can treat by deflagration & we may use the veg Acid since Hepar Sulph: is decomposed by them all & then we can get the Alkali by Distillation. The fossile

Alkali is always got in a mild chrystalline State but it may be rendered caustic in the same manner as the Veg: Fixt Alkali.

III Of its Chemical Properties Considered by itself.

It assumes a Chrystalline Form much more readily than ~~than~~ the veg: fixt Alk: does even before it is perfectly mild & when exposed to the Air it is so far from melting per deliquium that it becomes drier & has its Chrystals covered with a mealy Powder

Of its properties with reg- to other Bodies

The fossile Alkali unites with Acids with less Effervescence than the veg: Alk: which seems a little extraordinary as it contains more mephitic Air in the

State we commonly have it but the veg fixt alk: itself shews leſs effervescence in its Chrystalline Form than when a little more caustic the air seeming in that Case to be more strongly confined & more forcibly retained by it. The foſsile fixt Alk: forms different Neutrals from the Vegetable.— With respect to other Bodies Its force of attraction & effects on them are entirely the same allowing for any accidental Differences in the Degree of mildneſs or Causticity. So that it forms a Soap with oils Hepar Sulph: with Sulphur Glaſs with Earths &c.—

As this Alkali is used on the Coast of the Mediterranean viz: at Joppa Alicant & Genoa whence we get the best Soap It was thought that it was fitter for making Soap than Veg: Alk but this

I find is an erroneous Opinion by Expt & it is used there merely because they can have it more conveniently & cheaper In the same manner because the Venice Glass which was made by a Fossile fixt Alkali & a Chrystalline Earth was long the best that was manufactured in Europe we are not to conclude that the fossile fixt Alk: is fittest for the making of Glass since now the best is prepared in England where the veg: Fixt Alk is mostly used.

The Different Names of Foss: ⊖

1 *Natrum* This Term & that of Nitrum was indiscriminately used by the Ancts but as the latter is now confined to the Neutral Salt Natrum is only applied to the fossile fixt Alkali. ———

2 *Alkali Mineral* The French use this

[illegible] [illegible] [illegible] the [illegible]

[illegible] [illegible] for the [illegible]

[illegible]

[illegible] [illegible] [illegible] [illegible]

[illegible]

The Balsam call'd Rochelle [illegible]

[illegible]

[illegible]

[illegible]

for the manner [illegible]

[illegible]

[illegible] the same [illegible]

[illegible]

Of the [illegible]

[illegible]

Term for it but as I think the Term Mineral ought not to be taken in so general a sense as they do I have 3 changed it to *Foſsile Alkali* which I think is prefarable.——

4.– The Italians call it *Rochetto* in the rude impure State in which it is at first procured. Tis likewise called

5. Polverin when that is reduced to powder

6 Soda } Are the names given it by the
7 Barilia } Spaniards when in that State &

8 Kelp is the name by which it is universally known in Britain.——

Of the Volatile Alkali

I Its natural History.——

The Foſsile Kingdom does never afford us this Substance native Some Stones have been found which when broken have a smell very like that of the

Vol: Alk: but this is to be accounted for from certain Animal or Veg: Substances being washed down when in a putrid State & these Concretions forming round em Sal-Ammon: yeilds it but this is now allowed to be no native Substance being never found but near where Inflammable Bodies have been burnt. All these except Alcohol & pure Sulphur yield Soot which always contains this Salt in considerable Quantity. This Alk: is found both in animal & veg: Substances. Is it in these the production of Nature or Art? Tho vegetables shew little of it untill subjected to putrefaction & it is got in much greater Quantity from animal Substances which are more apt to putrefy yet I will allow that it may be found in both before they have cond

ll & not

be found.

undergone that Fermentation. The vinous Fermentation too seems capable of producing it For Tartar yeilds a Portion of it and that in greater Quantity than it can be got from the Juice of the Grape & it is always more or less present in Vinegar. ——

When the Fumes arising from the Inflammation of Nitre are collected they are found to consist in part of a vol: Alkali. Hepar Sulphuris yeilds also a portion of it.- By pouring Alcoh: on Vitriolate Tartar a Vol: Alkali is produced (that is to say it is converted into a Vit: Ammoniac) & lastly from the Combination of Vit: Acid with an expressed Oil by adding the muriatic we get a vit: Ammoniac. From these Facts Dr Butt endeavours to shew that the fixt Alkali is convertible into the Volatile & no great appearance of Probability.——

A German Chemist having found some vol: Alk: in the residuum of Mineral Water concluded that it was present sometimes in Minerals but this has been more probably produced by a Hepar Sulphuris which these undoubtedly often contain. ——

—— The manner we procure vol: Alk:

-This Alk: is procured for use either from animal Substances or common Sal Ammon:

1– Animals yeild it by Distillatio per se but this Practice can only be carried on with Advantage at large & is therefore seldom practised by the private Chemist

2.-It is got from Sal Ammon: in consequence of Elective Attract^{n} by the Addition of fixt Alk^{s}: Absorb^{t} Earths or Metals all of which attract the muriatic Acid x The more Solid Parts of Animals produce this in the greatest Quantity as horns hoofs Bones &c the last of which is generally practised on for procuring it

more strongly than it. The use of common Chalk yields it equally pure in greater Quantity & with leſs Expence than either the fixt Alk: or Metals. – If to lbj of Sal Ammon: which does not contain above lbſs of vol: Alk we add lbj of Chalk we get from it lbj of vol: Alk: How is this extraordinary Fact to be accounted for? Nothing ever puzzled the French Chemists more when they were made acquainted with it for the practice of using Chalk begun in England & continued for a considerable Time before it was introduced into France Du-Hamel imagined that there was a part of the Chalk volatilized along with the vol: Alk. But he did not reflect that Tournefort a Countryman of his own had formerly observed that He obtained more vol: Alk: by the use even of fixt than his Sal ammon: contained

& what entirely confutes his Opinion is that the vol: Alk: thus obtained is perfectly pure. The knowledge we now have of the mephitic Air & its relation to Alkie explains this Matter The vol: Alk: in Sal Ammon: is in its caustic State (as all alkalies are when joined to acids) Now the Acid leaving it & joining the Chalk sets loose the Air of the Chalk which unites with the volat: Alk: & of consequence increases its weight & at the same time gives it in a mild State The same thing happens if we use the mild fixt Alk:. But if Quicklime or Caustic fixt Alk: be added to the Sal Ammon: (or the Calx of Metal) none of which contain any mephitic Air we do not get the vol: Alk: neither in near such a Quantity nor in its mild State.

The [illegible] [illegible] [illegible] [illegible]

[illegible] Vol. Alk. than the fixed Alk. [illegible]

[illegible] because the common fixed Alk. is

not perfectly mild and much more of it

[illegible] ———

II The properties of Vol. Alk. produced by itself ——

The Vol. Alk. differs in the appearances [illegible] as it is made [illegible] [illegible] they distilled in the fixed [illegible] [illegible] [illegible] it is always [illegible] [illegible] of the Vol. Alk. which we [illegible] [illegible] [illegible] [illegible] [illegible] of the [illegible]

It may be [illegible] that the Vol. Alk. is not perfectly mild.

[illegible] [illegible] with regard to the Vol. Alk.

[illegible] [illegible] [illegible]

[illegible] with the acids to produce [illegible]

[illegible] [illegible] [illegible] the [illegible]

[illegible] the and the [illegible] [illegible]

[illegible] The [illegible] [illegible] [illegible]

[illegible] [illegible] [illegible] the [illegible]

[illegible] [illegible] The [illegible] [illegible]

[illegible] [illegible] [illegible] [illegible]

[illegible] [illegible] [illegible] [illegible]

the Bord [illegible] [illegible] [illegible]

[illegible] [illegible] the [illegible] of the [illegible]

which [illegible] [illegible] the [illegible]

[illegible] [illegible] [illegible]

of the [illegible] [illegible] [illegible]

[illegible] [illegible] [illegible]

[illegible] the [illegible] [illegible] of the [illegible]

[illegible] [illegible] [illegible] in the

[illegible] in the [illegible] of [illegible]

[illegible] [illegible] [illegible]

[illegible] the [illegible] of the [illegible]

[illegible]

—The Reason why Chalk affords us more Vol: Alk: than the fixt Alk: does is because the common fixt Alk: is not perfectly mild but wants some of its Mephitic Air. ——

III The properties of Vol: Alk: —
Considered by itself. —

1.—The Vol: Alk: differs in its Appearance according as it is mild or Caustic being easily Chrystallized in the first case but when Caustic it is always fluid because on acct of its Volatility which is much greater when Caustic it cannot be rendered solid by the Force of the Fire.—

2.— It may be Chrystallized like the Foss: fixt Alk: tho not perfectly mild. ——

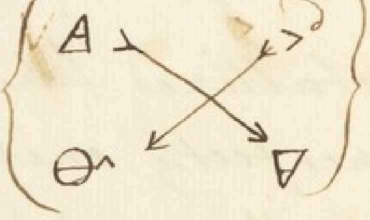
— Of its properties with respect to other Bodies

1— The other Saline Substances.—

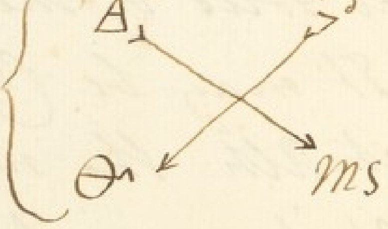
It joins all the acids & produces Neutrals with them without any effervescence when

Caustic.[+] So much have the Chemists been misled by the notion of Effervescence with Acids being necessary to the nature of Alk: that Boerhaave after enumerating the other Properties which the caustic fix: Alk: has in common with the rest of the alkalies adds. "Nec tamen Alkalinus". — It has commonly been said that the vol: Alk: attracts acids more strongly than Earths or metals but this is only applicable to the mild vol: Alk: when a true double Elective Attraction takes place as is evident from the following Schemes

I



II



2 Inflammable Bodies.

α It does not unite with oils at all in its mild State & but imperfectly when Caustic

× When Joined to a concentrated Acid it generates Cold; When with a Dilute one, Heat, This is to be accounted for from the Qy of Water contained in the dilute Acid with which this Alk. generates Heat

because it seems to get a quantity of Mephitic Air from the Oil which renders it soon mild.

The very same thing may be said of its relation to Alcohol. If indeed it be united with Water to the point of Saturation even when mild & Alcoh: be then added & the Phial shaken suddenly the whole will concrete in a solid Maſs but soon ag^{n} the Alcohol resumes its fluid form & we find that it has only precipitated the vol: Alk: from the water & united with it itself & by the shaking of the veſsel so suddenly the Alcali had concreted before it was quite disengaged from the water & had entangled it & the Alcohol both. If the same Experiment had been made without shaking the Vial no Concretion would have happened.

V The Vol: Alk: forms a Hepar Sulphuris with Sulphur. Hoffmans Volat: Tincture of Sulphur which he so much recommends is nothing else. ——

3 Metallic Substances

It unites with such Metals as the fixt Alk: does both in the way of Solution & Precipitation In Sublimation it has been said to volatilize Metals but this is principally in the State of an Ammoniacal Salt so that such an Effect cannot properly be attributed to it. With Copper it strikes a beautiful blue & by this means we can discover if a Fluid contain any vol: Alk by pouring on it a Solution of Copper which immediately if that is the case will aſsume such a Colour. ——

[illegible] [illegible] [illegible] Rhythm in the [illegible]
of [illegible] [illegible] [illegible] of the [illegible]
[illegible] [illegible] the [illegible] [illegible]

S. [illegible]

When used as a [illegible] [illegible] [illegible]
[illegible] [illegible] [illegible]

[illegible] [illegible]

The [illegible] [illegible] the same effect on
[illegible] [illegible] [illegible] with the [illegible]
the [illegible] [illegible] [illegible] [illegible]
[illegible] [illegible] of the [illegible] [illegible]
[illegible] [illegible] [illegible] [illegible]

The different names of the [illegible]
[illegible] [illegible] [illegible] a [illegible]
[illegible] of [illegible] according to the [illegible]
[illegible] [illegible]

[illegible] [illegible]

[illegible]

A Method of Balances

[illegible]

4 Earths.

It does not unite with Earths in the way of Fusion probably on acct of its volatility but it dissolves the Calculus of Urine.—

5 Water.

When mild it generates Cold with Water & heat when Caustic.

Animal & Veget: Substances.

The vol: Alk: has the same Effects on Animal & Veg: Substances with the fixt only its power of Corrosion is less. It checkes Fermentations of all Kinds even the putrescent tho it be produced by it.— Vid: Dr Pringle's Experts

The different names of the Vol: Alk:

The vol: Alk: had formerly a great variety of Names according to the different means used in obtaining it. In the Codex Medicamentarius published not long ago by the Faculty at Paris there are still twelve names for it retained In the London Dispensatory they have only two & the Colledge of Edinburg have but three They are 1.st <u>Spiritus Salis Ammoniaci</u> when distilled from Sal Amononiac:

2 <u>Spiritus Fuliginis</u> when distilled from soot without any previous preparation of the Sal Ammoniac: ——

3. Sal Cornu Cervi or Spiritus C: C: when distilled from animal Substances of any kind & so called because the Hartshorn was used formerly tho now the Bones & solid parts of any Animal are practised upon The Spiritus Cornu Cervi is only the Sal C: C: diſsolved in Water. ——

When the vol: Alk: is rendered Caustic by means of Quicklime it is called <u>Spiritus Salis Ammoniaci cum Calce viva</u>

[illegible] the Remainder [illegible]

[illegible]

[illegible]

[illegible] to the College of Physicians

[illegible]

[illegible] when [illegible] from the [illegible]

[illegible] when [illegible]

[illegible] any [illegible]

of the [illegible]

The [illegible]

[illegible] from [illegible]

[illegible]

[illegible] the [illegible] the [illegible]

[illegible]

[illegible]

[illegible] the [illegible]

[illegible] the [illegible]

[illegible] of [illegible]

[illegible]

Perhaps there is no impropriety in the use of these names just mentioned as there is really some difference in the vol: Alk: according as it is procured from Sal Ammon: Soot or Animal Substances tho this is merely from the presence of some extraneous Matter. The Spt. Salis Ammon: is the purest & the Spir. Fuliginis retains a portion of Empyreumatic Oil which is difficult to separate & which Physicians often would not wish to be separated.

Of Neutral Salts.

Having thus finished the consideration of the two simple S. Salts our Plan now leads us to the Chemical History of neutral Salts which we shall begin with an acc.t of the various names they have got & some general observations on their Composition and Decomposition ———

The Names of Neutral Salts

1.-They have been called not improperly Sales Salsi in opposition to the other two kinds of Compound Salts Sales Terrestres & Metallici Macquer has mistaken this term egregiously confining it to those Earthy Salts produced by Absorbt. Earths & Acids which no Chymist but himself ever meant by Sales Salsi. ———

2.-Sales Enixi because they are the joint Product of Acids & Alkalies. ———

3.-Sales Medii.- This name was given them from a Theory which is far from being just of their possessing Properties as it were in the middle between those of their two component Parts. ———

Neutral Salts as the most proper names
as they really are neutral in their proper-
ties with respect to Acids & Alkalies.

Of their Composition

Neutral Salts may be formed either by mix-
ing the pure acid & alk together or by the com-
bination of one or other of the Salts
with a [illegible] containing the other or
chiefly by means of two neutral salts of
which [illegible] one of the simple Salts
[illegible] second thus may be considered as [illegible]
[illegible] either when the Acid or Alk [illegible]
[illegible] that is [illegible] taken for [illegible]
[illegible] composition of Salts
[illegible] of the simple Acid & Alkalies
[illegible] of the simple acid to a neutral [illegible]
[illegible]
[illegible] of the simple [illegible]

4 Neutral Salts is the most proper Name because they really are neutral in their properties with respect to Acids & Alkalies. ——

Of their Composition.

Neutral Salts may be formed either by add^{g} the pure acid & Alk: together or by the Combination of one or other of the Salts with a mixt containing the other or thirdly by means of two mixts each of which contains one of the simple Salts The second Way may be considered as two=fold either when the Acid or Alk: is simple so that we may reckon four Cases of the Composition of Salts. ——

1.-The Union of the simple Acid & Alkali.

2.- The addit^{n} of the simple acid to a mixt containing the Alkali. ——

3 The union of the simple Alkali with a mixt containing the Acid. ——

4.- The addition of two mixts to each other one containing the Alkali the other the Acid.

The proper means of performing these & which deserves the preference shall be mentioned under the particular Salts only we shall here observe that the best test of the point of Saturation when we use the acid & Alk: simple is their no longer affecting the colour of Syrup of Violets for no rule can be founded on the stopping of the Effervescence since we know that in their caustic State Alkalies shew no Effervescence at all Indeed there is no need for such Delicacy as Boerhaave would make us believe in this Affair since in most Cases the Acid & Alkali will not combine beyond that Point[x] Spiritus Myndereri is an exception only

× Alumen is an Exception as ye Vitr: Acid is not in that saturated with Earth as may be seen by adding to it a solution of fixt Alk. which will precipitate the Earth which on standing will be agn taken up [illegible] of the [illegible] [illegible] [illegible] the [illegible] the [illegible] the [illegible]

The progress [illegible] of [illegible] the [illegible] [illegible] the [illegible] which [illegible] [illegible] the [illegible] [illegible] [illegible] [illegible] [illegible] that the [illegible] [illegible] of the [illegible] of [illegible] [illegible] [illegible] the [illegible] to the [illegible] of these [illegible] [illegible] the [illegible] of [illegible] of [illegible] [illegible] [illegible] [illegible] the [illegible] of the [illegible] [illegible] [illegible] [illegible] [illegible] that [illegible] [illegible] the [illegible] [illegible] [illegible] [illegible] in [illegible] [illegible]

[illegible]

because it cannot be chrystallized.—

Of their Decomposition.—

This may be done.—

1.– By the force of Fire alone in consequence of the Acid being more volatile than the Alkali We shall find afterwards that this is not universal as it does not take place in any of the Ammoniacal Salts nor in Vitriolate Tartar or Glaubers Salt.—

2.– By adding the Phlogiston which volatilizes the Acid This also is not universal

3 By Elective Attraction in general.—

NB In strict propriety of Language the Term Decomposition is only applicable to a higher Degree of Composition viz the Formation of a Decompound. & as such it was used by the earlier English Writers on Chemistry. But as of late it has been substituted in Place of Resolution & does not seem to be mistaken by any

Body I here use it in that Sense & shall think it suffic^{t} to have thus given my reason for adopting it.. ——

In treating of the different Neutral Salts we shall follow the order of the Table (p 7th) & begin therefore with.

I Vitriolate Tartar

This Compound Salt I believe is never native It is found in the ashes of Plants it must be owned but probably the product in that case of the Fire Be that as it will it is always formed by art for the Purposes of medicine Many various Combinations may be used for the production of it according to the four different Cases of the Composition of Salts mentioned in (p) of these we have given a Table on the opposite Page at least of the most remarkable [illegible] [illegible] [illegible] are different neutral

[illegible] what are those set down

Table of the different Neutral

Salts Tartar may be formed

The Alkali

The Base

1. Tart. acid simple — Veg. fixt Alk. [illegible]

2. [illegible] acid simple — Nitre

Vegetable Salt

Ammoniacal Tartar

[illegible] of veg. fixt Alk.

[illegible] of veg. fixt Alk.

3. [illegible] — Veg. fixt Alk.

[illegible]

[illegible]

[illegible]

[illegible] the [illegible]

of them for there are others perhaps besides what are there set down.

Table of the different Ways that Vitriolate Tartar may be formed.

	The Acid	The Alkali.
Case. 1.	Vit: acid simple	Veg: fixt Alk: simple
Case 2.	Vit: Acid simple	Nitre.
	———	Digestive Salt
	———	Regenerated Tartar
	———	Soap of veg: fixt Alk:
	———	Hepar Sulph: of veg: fixt Alk:
Case. 3	Vitriolic Ammoniac	Veg: fixt Alk:
	Vitriols	———
	Allumn	———
	Selenites.	———
	Magnesia Glaubers Salt.	———
	Sulphur & the Ores.	———
Case 4	Vitriolic Ammoniac.	Nitre
	———	Digestive Salt.
	———	Regen: Tartar &c

Table Continued.

Acid	Alkali
Vitriols	With Regenerated Tartar &c
Alumn	
Selenites	
Magnesia Glaub: Salt	
Sulphur ------	Nitre
Antimony ----	Nitre.

Little needs to be said to illustrate or explain this Table as we shall easily see how by means of Attractn either simple or Elective in all the Instances in it a Vitriolate Tartar must be formed

2.— From our Knowledge of the different forces of Attraction of the Acids we know that Vit: Acid decomposes Nitre D.ce Salt

[illegible] [illegible] [illegible] [illegible] [illegible] [illegible]
[illegible] [illegible] [illegible] the [illegible] [illegible] [illegible]
[illegible] [illegible] [illegible] [illegible] the [illegible]

[illegible] [illegible] of the [illegible] [illegible]
[illegible] [illegible] the [illegible] [illegible]
[illegible] [illegible] [illegible]

[illegible] [illegible] [illegible]
of the [illegible] to the [illegible] [illegible]
[illegible] [illegible] [illegible] [illegible]
[illegible] [illegible]

[illegible] [illegible] [illegible] [illegible]
the [illegible] of the [illegible] [illegible]
[illegible] [illegible] [illegible] [illegible] [illegible]
[illegible] of the [illegible] of [illegible]
the [illegible] [illegible] of [illegible]
[illegible] [illegible] [illegible] [illegible]
[illegible] [illegible] of [illegible] [illegible]
[illegible] [illegible] [illegible] [illegible]
[illegible] [illegible] [illegible]

& Regen: Tartar, & forms a vitriolate Tartar with their Alkali. - The Vit: Acid in the same way combining with the veg: Fixt Alk of Soap in consequence of its greater force of attraction than Oil decomposes it and produces this Neutral Salt. ——

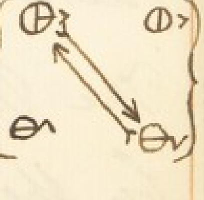
- Hepar Sulphuris is decomposed by any of the Acids & the Sulphur is set at Liberty Hence the Add.ⁿ of vit: Acid to it forms vitriolate Tartar. ——

NB If we take Hepar Sulph: & expose it to the action of the Fire the Phlogiston is dissipated & a vit: Tartar left which contains 15/16 of the weight of the Sulphur in the Hepar Sulphuris of Vit: Acid by which we discover that Sulphur con=tains at least 15-oz: of vit: Acid in the Pound

§3. The Vol: Alk: of Vit: Ammon: is set loose by the veg: fixt Alk: which joins its Acid

When we say that Vitriols added to Veg fixt Alk: form a Vit: Tartar we would be understood to mean by Vitriol all the metallic Salts formed by the vit: Acid It was by adding veg: fixt Alk: to Selenites that Margraave discovered that to be an Earthy Salt consisting of vit: Acid & an Absorb^{t} Earth.— When to Sulphur or any of the Ores of metals containing it we add veg: fixt Alk: a Hepar Sulphuris is formed which by being long exposed to the force of the fire has its acid dissipated as was just observed.——

4 The Vit: Ammon: & Nitre being joined a decomposition & new Combination takes Place by means of double elect Attract^{n} according to this Scheme



However this new Combination can

[illegible] the Plane [illegible] [illegible] [illegible]

[illegible] placed [illegible] [illegible] [illegible] the [illegible]

[illegible] by [illegible] [illegible] [illegible]

from the farther distance of the [illegible] [illegible]

[illegible] [illegible] [illegible] [illegible]

forming [illegible] Point

The same may be said of [illegible] [illegible]

[illegible] Electrical Attraction [illegible]

The [illegible] [illegible] [illegible] [illegible] [illegible]

[illegible] [illegible] [illegible] [illegible] [illegible]

[illegible] [illegible] [illegible] [illegible] [illegible]

[illegible] [illegible] [illegible]

[illegible] [illegible] [illegible] [illegible]

[illegible] the [illegible] [illegible]

[illegible] [illegible] [illegible]

[illegible] Position of [illegible] [illegible]

[illegible] they [illegible] [illegible] [illegible]

[illegible] form a [illegible] [illegible] [illegible]

be [illegible] to [illegible] by [illegible] [illegible]

[illegible] [illegible] formed by the [illegible]

It [illegible] by adding [illegible] [illegible] to the

[illegible] Manganese [illegible]

[illegible] [illegible] [illegible] consisting of [illegible]

[illegible] Earth — [illegible] [illegible]

[illegible] of the Ores of metals containing

[illegible] [illegible] [illegible] [illegible]

formed which by being long [illegible]

to the force of the fire [illegible]

[illegible] some [illegible] [illegible]

[illegible] [illegible] being [illegible]

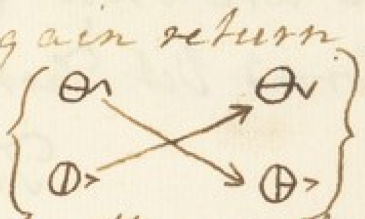
[illegible] [illegible] by [illegible] [illegible]

[illegible] the [illegible] of [illegible]

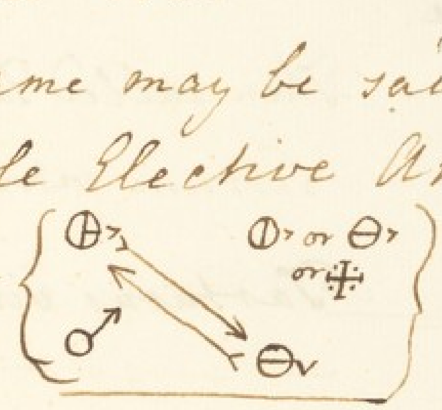
[illegible] [illegible] [illegible]

[illegible] [illegible] [illegible]

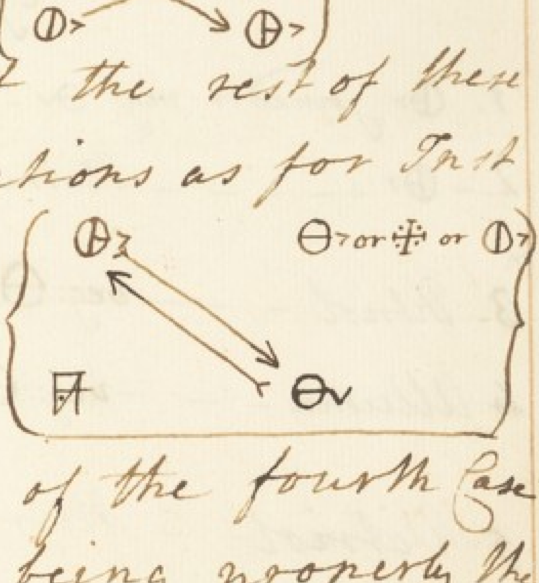
only take Place when such a Heat is applied as to volatilize the combined vol: Alk: & Nitl acid together & prevent em from the farther Action of the other two Bodies else they woud again return to their former State. Thus



The same may be said of the rest of these Double Elective Attractions as for Instance



or



The two last instances of the fourth Case may be considered as being properly the same for Antimony as we have it is properly an Ore containing Sulphur.

The Vitriolate Tartar may be formed in all the ways already mentioned yet there are but a few of them that are used in Practice Of these we shall give some account & of the different names it has according as they differ. ——————

Of the Means used in Practice to form Vitriolate Tartar & of its different Names

There are only 8 Combinations in use for form^g^ Vit: Tartar of which the follow^g^: is a Table

Table.

1. ⊕r joined to veg: ⊖v - - - - Then called Tartarus Vit:
2. - ⊕r — — - - - Nitre - — - Nitrum vitriolatum
3. Vitriol - —— veg: ⊖v }
4. Allumn - - —veg: ⊖v } = - — Tartarus vitriolatus —De duobus:
5. Vitriol - - Nitre }
6. Allumn - - - Nitre } - — Sal enixum Paracelsi —de duobus. ——— Arcanum duplicatum Panacea ducis Holsatiæ
7. Sulphur - - Nitre - - - Sal polychrestum
8. Antimony - - Nitre - — Nitrum stibiatum

None but the first third & fourth of these have been ever used with a view to form vitriolate Tartar the rest were

[illegible]

Of the Means used [illegible] [illegible]

[illegible] [illegible]

There are [illegible] of [illegible] [illegible]

for formed the [illegible] of [illegible]

Table

1. Do [illegible] eq Do

2. Do [illegible] [illegible]

3. [illegible] — eq Do } [illegible]

4. [illegible] — eq Do

5. [illegible] [illegible] } [illegible]

6. [illegible] [illegible] [illegible]

7. [illegible] [illegible] [illegible]

8. [illegible] [illegible] [illegible]

[illegible] the found [illegible]

[illegible] have been [illegible] [illegible]

[illegible]

thought to produce Salts of peculiar & extraordinary properties & accordingly here as appears from the Table have got distinct Names. As to the first Method of combining Vitriolic acid & veg: fixt Alk: alone it must seem the simplest & most obvious but notwithstanding is not the most eligible Method When the Vitriolate Tartar is made in this way it has always a superabundant Quantity of Acid adhering to its Chrystals which it is very difficult to separate Hence the Practice has been little used & I know no case in which it has been prescribed unless in the making Dovers powders There indeed it has been ordered for about 120 Years The third & fourth Combinations are most common & justly have got the Preference Since in adding the fixt veg: Alk: to Alumn or Vitriol there can no more of the Acid be separated than is just sufficient to saturate the first Alk: since it cannot attract more from the Earth or Metal These are separated from the neutral Salts now formed by Lixiviation & then we have only to chrystallize the Salt. We are here confined to the use of green Vit since the other Metals except Iron impregnate the acid with a deleterious Quality The Salt produced by these Combinations & the first has always been called Tartarus Vitriolatus or Tartarum vitriolatum. —

— When as in the second Case the Salt is formed by adding Vit: to Nitre which is commonly done in the Distillation of the Nitrous acid (so that the formation of a new salt is only a secondary design) It is always called Nitrum Vitriolatum [illegible] from [illegible] may be among [illegible]

[illegible] of the Northern Power [illegible]

The Resolution the Author [illegible]

Discouraged [illegible] that [illegible]

[illegible] both [illegible]

[illegible] of Nature the [illegible]

[illegible] both [illegible]

[illegible] [illegible]

[illegible] [illegible]

[illegible] [illegible]

The diffrce of Solub y affords a very cert method of Separation

& perhaps there may be some reason for giving it a particular Name because in this Operation the Nitre is never entirely decomposed so that we have left in the retort both a Vitriolate Tartar & a portion of Nitre The nitrous Acid might perhaps with much pains be separated entirely but it wou'd be very expensive The trading Chemist commonly vends this to the Apothecaries for Vitriolate Tartar & Physicians sometimes prescribe it on Purpose supposing it to poſseſs Virtues different from either Vitriolate Tartar or Nitre. Perhaps it has these but the prescribing it is an inaccuracy highly blameable since the Nitrum vitriolatum made in two different Operations will probably different Operations will probably differ widely according as there is more or less of the nitrous acid set at Liberty If it is to be used in Medicine let the Physician prescribe a mixture of Nitre & Vitriolate Tartar in such a determined Proportion as he finds most useful.—

— If (as in the 5th & 6th Case Vitriol or Alumn be joined to nitre the Salt prod=uced was named Arcanum Duplicatum because about 100 Years ago it was thought to produce wonderful Effects & was composed by means of 2 other Comp^d Salts — Sal enixum Paracelsi & Sal de duobus are 2 other names for it both because it was formed of two compound Salts & lastly it was termed Panacea Ducis Holsatiæ because it was prepared in a Laboratory of the Duke [illegible] by [illegible] [illegible] [illegible]

[illegible] [illegible] by the [illegible]

the [illegible] of great [illegible]

[illegible] to be the same that

[illegible] to be [illegible] as they shall [illegible]

[illegible] be made or [illegible] [illegible]

[illegible] [illegible]

for the [illegible] to [illegible] these goods [illegible]

[illegible]

[illegible] Subjects of [illegible]

[illegible] have that [illegible]

[illegible] and [illegible] [illegible]

[illegible]

those [illegible] the Person of [illegible]

[illegible] the same [illegible]

[illegible]

[illegible]

[illegible]

of Holsteins & Sold from thence as a Panacea. These names as they were founded on the supposition of great varieties in what is now known to be the same Salt ought to be rejected as they still naturally lead to such a Supposition These too may be reckoned as Nitrum Vitriolatum for the Nitre is not there quite decomposed.

In the 7th Case Sulphur & Nitre joined & deflagrated together have their Phlog & Nitrous acid dissipated & a vitriolate Tartar is left which goes in the Shops under the Name of <u>Sal Polychrestum</u> because it too was thought to have remarkable virtues. It has the smell of Hepar Sulphuris from a Portion of Sulphur always adhering to it but how

=ever I would not ascribe any virtues to it on that account nay I rather think it is an Objection to the use of it in Medi=cine as it renders the Taste of it disagreeable yet I always prescribe it in place of Vitriolate Tartar bec: (as I before observed) we generally get a Nitrum Vitriolatum inst=ead of that from the Apothecarys. —

When in the 8th Case we deflagrate Nitre & Antimony together we procure a Vitrio=late Tartar also from the Sulphur of the Antimony This way of forming it was discovered accidentally & the Salt was called Nitrum Stibiatum Stibium being the ancient Term for Antimony. —

"Perhaps it might be asked why in these Cases "I have not mentioned the union of Alcohol "& vit: acid with fixt alk: but from Experim=ents we find that fixt Alkali has no Effect [illegible] of the [illegible] [illegible] [illegible]

[illegible] [illegible] the Pyramid [illegible]

[illegible] [illegible] [illegible] described the [illegible]

[illegible] Membrane only [illegible] [illegible]

[illegible] was [illegible] [illegible]

[illegible] admitted as a [illegible]

[illegible] of the [illegible]

[illegible] perfectly [illegible] admit of any [illegible]

of the Properties of British [illegible]

[illegible] perfectly [illegible]

[illegible] the form of [illegible] Pyramids

[illegible] which [illegible]

[illegible] different [illegible]

[illegible]

[illegible]

is it on that account being neither [illegible]

it is not offensive to the nose [illegible]

[illegible] and it renders the Taste of [illegible]

[illegible]

of [illegible] Tartar than I have been

[illegible] get a [illegible]

and of that from the Apothecary

Then on the 4th [illegible]

[illegible] together [illegible]

take Tartar also from the [illegible]

[illegible]

[illegible] to the [illegible]

called [illegible]

the [illegible]

[illegible]

"upon Æther for the Acid & Alcoh: seem to
"be unalterably united The French formerly
"used to make their dulcified Spt of Vitriol
"by simple Mixture only but in this Case
"the union was never perfect This then
"is not to be admitted as a fair Trial
"Tis likewise a Quere if the Vit: Acid & Oil
"when perfectly united admit of any disunion.–

Of the Properties of Vitriolate Tartar

When very carefully chrystallized this Salt aſsumes the form of 6-sided Pyramids in its Chrystals which are of a hard Concretion & are of more difficult Solution than any Neutral Salt requiring more Water than any of em to render em fluid It has been commonly said by the Chymists to require 20 times its weight of Water but I imagine a greater Quantity wou'd be neceſsary viz 30 times its weight in the common temperature of the Atmosphere. ———

Vitriolate Tartar if at all fusible is so little that in our Furnaces we are not able to fuse it. ———

In the Fire or heated to a certain degree it decrepitates i-e makes a crackling Noise in consequence of the Rarefaction of Air contained in it it which makes pieces of it start up frequently in the Veſsel. — This Neutral Salt may be decomposed by adding Phlogiston so as to form a Hepar Sulphuris (vid: P) but no single Elective Attraction will have this Effect We have shewn in speaking of Double Elective Attractions that the Solution of Silver will in this manner decompose it. —

The Vitr. Tartar may be thus decomposed by any other Metal diſsolved in the nit?
or any other acid

Of Gilbert Hill.

[illegible] Some reason to think [illegible]
a native Inhabitant, yet we may [illegible]
not [illegible] [illegible] [illegible] by
the many Instances given of it by those
[illegible] [illegible] that it probably they have
mistaken the Manners of Cambers Hill for
of this Hill has been nearly the same
Neighbours with the true Cambers Hill
[illegible] have been [illegible] [illegible] for at other
[illegible] [illegible] Form of Gipsy Hill [illegible]
[illegible] [illegible] [illegible] [illegible] [illegible]
[illegible] Hill [illegible] [illegible] by the [illegible]
[illegible] [illegible] [illegible] [illegible] [illegible]
[illegible] [illegible] [illegible] [illegible]
[illegible] [illegible]

[illegible]

[illegible] The Article of the [illegible]
[illegible] [illegible] Parliament [illegible]
[illegible]
[illegible]
[illegible]
[illegible] of the [illegible]
[illegible]
[illegible] on the [illegible]
The Article shall [illegible]
[illegible]
[illegible]
[illegible] shall have this effect
[illegible]
[illegible] that the [illegible]
[illegible]
[illegible]
[illegible]
[illegible]

Of Glaubers Salt.—

Tho I have reason to think Glaubers Salt a native Substance yet we may recollect here what was said formerly of the many Instances given of it by French writers viz that it probable they have mistaken the Magnesia Glaubers Salt for it. As that Salt has very nearly the same Qualities with the true Glaubers Salt it has been much used for it either in the shivery Form of *Epsom Salt* or more firm & brought nearer to the true Salt when it goes by its Name The true Salt is now begun to be more used in Scotland & for use it is made by distilling Mur: Acid from common Salt by means of the vitriolic Acid

The Magnesia Glauber's Salt may be distinguished from it by the addition of fixt veg: Alk: to a Solution of it for if it is the Earthy Salt a precipitation of the Earth takes Place For the diff^{t} Combinations that may be used in forming it see the following Table.

Table of the Diff^{t} ways of forming Glaubers Salt.

	Acid	Alkali
1.	Vit. Acid simple	Foſsil Alkali simple
2	Vit Acid simple ~~Vitriol~~ ~~Alumn~~	Cubic Nitre Common Salt Sal polych. of Roch Soap of foſsil Alk Hepar Sulp. of foſs alk
3	Vitriolic Ammon. Vitriols Alumn Selenites Magn. Glaubers Salt Sulph. & the Ores.	Foſsil Alk.

[illegible] of the Lens [illegible]

[illegible]

[illegible]

[illegible]

Vitreous

Humor

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

Of the properties of glass and

[illegible] of the [illegible] of [illegible]

[illegible] from the [illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible] Standard [illegible] [illegible]

[illegible] formed by the Division of

pound weight [illegible] [illegible] of [illegible]

[illegible] the [illegible] [illegible] proportion of

the [illegible] [illegible] from the [illegible]

[illegible] that [illegible] [illegible] [illegible]

at the following [illegible]

Table of the Diff. [illegible] of [illegible]

[illegible]

lbs [illegible]

1st [illegible] length

2nd [illegible] length

[illegible]

[illegible]

[illegible]

Cont. of Table of Glaubers Salt

Case 4	Vitr. amm. ——	Cub. Nitre Common Salt Sal polych. of Roch:
	Vitriols Alumn Selenites Magnes: Gl. Salt	with Sal polych Common Salt or Cubic Nitre.
	Sulphur ——	Cubic Nitre
	Antimony ——	Cubic Nitre

Of the properties of Glaubr: Salt

The form of the Chrystals of Gl: Salt is that of a 6-sided prism. Its Chrystals are likewise of a looser Contexture because they contain more water than those of Vitriolate Tartar or even any other Salt whatever The Glaubers Salt attracts what Water is necessary for its Chrystalline Form so greedily that it turns immediately into Chrystals when it has that Opportunity by the Application of Water from this it has been said to Congeal Water but it does so only in its Calcined State

It is more easily soluble in Water than any Neutral Salt & here we have a fine Opportunity of observing the Changes that happen to Bodies in Composition. The Vit: Acid & the veg fixt Alk: (in the State+ in which it always is when it forms a Neutral) attract water strongly when simple & readily unite with it The vit: Tartar is the most difficult of Solution of any Salt On the other hand foſsile fixt Alk: is not Deliquescent & seems to have much leſs Attraction to water & yet Glaub: Salt is of vastly easier Solution.—

+ viz a Caustic State

[illegible] appearance [illegible]
when known that it had been [illegible]
which had [illegible] the [illegible]
Which become easily visible on [illegible]
[illegible] that & here we have
fine opportunities of observing the
[illegible] that happen to Bodies on
Evaporation. The Ink used to the [illegible]
[illegible] (in the [illegible]) [illegible]
in which it formed & distinctly [illegible]
matter strongly when [illegible] by [illegible]
[illegible] at the [illegible] Parts or the
more difference of situation of any
that on the other had [illegible]
is not [illegible] & [illegible] I have
[illegible]
and [illegible]
[illegible]

It is very easily fusible in the Fire The Exp^ts of the French with respect to its Effects on Metals I am not in a Condition to mention.

Glaubers Salt can only be decomposed in the Manner which Vitriolate Tartar is decomposed in.

We should now proceed according to the Order of the Table to Vit: Ammon: but it will be found more conven^t to leave all the Ammoniacal Salts to be consid=ered together & therefore we shall at present enter upon the Chemical History &c

Of Nitre

The neutral Salt which goes under this Name was unknown to the Greeks & Romans It seems to have been first discovered in Asia whence the Arabians who had great Communication with that Part of the World brought it to the West.– For ab.t 500 Years it has been a great Article of Commerce from Asia. The Accounts we have of the manner it is procured there all tell us that it is got by Lixiviating the Soil or Staple of their Ground. In this part of the World (viz Europe) Nitre itself is never produced in the Earth but Animal & Vegetable Substances when put in an Earthy Matrix & subjected to Putrefaction yeild an Ammoniacal Nitre & we form the common Nitre by Lixiviating this with veg fixt Alk. That there should be so great a Difference between the Operation

of Reference on the [illegible] [illegible] of [illegible]
that [illegible] Common Law [illegible] [illegible]
on the part of the [illegible] [illegible]
in the latter [illegible] [illegible] [illegible]
and the [illegible] in [illegible] of the [illegible]
of [illegible] in which [illegible] [illegible] [illegible]
by [illegible] [illegible] in that
is [illegible] [illegible] [illegible]
respect of I [illegible] [illegible]
with regard to the [illegible]
[illegible] for [illegible] [illegible] [illegible]
[illegible]
[illegible] of the [illegible] [illegible]
[illegible]

[illegible] in Law where the Lords

who had good Communication with

the Heads of the Bank brought

the Bill [illegible] [illegible] [illegible]

upon a great Article of Commerce from [illegible]

The Interest or Share of the [illegible]

[illegible] [illegible] there [illegible] [illegible] that

[illegible] [illegible] by [illegible] the [illegible]

[illegible] of their Commerce. The [illegible]

of the [illegible] [illegible]) [illegible]

is [illegible] proposed in the [illegible]

[illegible] by Reasonable [illegible]

[illegible] [illegible] [illegible] [illegible] [illegible]

[illegible] [illegible] [illegible] any [illegible]

[illegible] [illegible] by [illegible] the [illegible]

[illegible] [illegible] [illegible] that [illegible]

[illegible] That there should be [illegible]

[illegible] between the [illegible]

of Nature in the East Indies & here as that a Common Nitre is produced in the first & a Nitrous Ammoniac in the latter seems very extraordinary But the Accts we have of the making of Nitre in Asia are from inaccurate & injudicious Observers so that we may readily suppose these Accts imperfect. & I have been told a Fact with regard to this matter which if true (for it was not from the best Authority I had it tho the great Probability of the Thing makes me believe it) clears up the Difficulties that occur. It is this viz That they burn a great many Vegetable in Asia on the place where they want to produce Nitre & leave their Ashes to have their Alkali washed in by the rains which will infallibly decompose the Nitrous Ammon: & form a Nitre in the Earth which will now be got by simple Lixiviation Is it not extremely probable that those who have given an Account of this Matter have neglected the Inflammation of the vegetables considering it as merely designed to free the Earth of the Vegetables Nay perhaps the Inhabitants may have no other Intention.

The Chief Manufactories of Nitre in Europe are in France & Pruſsia Perhaps it might be made with advantage in this Country & as

t as a thing of so great consequence and
shall lay down the most material rules
with regard to it.

Of the Manufacture of

[illegible] to shew an art the [illegible]
considerably compensated with gradual
improved by one Deliberation as the common
Gardener could. To this the most eminent
[illegible] prudent Deliberation as [illegible]
suppose this by as Carrie an Profession
[illegible]able to the Fair season of [illegible]
Perfection

The tree must not on the one hand
be too rich nor on the other must it
be too meagre for [illegible]
[illegible] perfection. Accomplishment [illegible]
[illegible]

[illegible] which worked on by the Means
[illegible] will infallibly [illegible]
nothing [illegible] to form a Pattern in the
[illegible] which will never be got by any
observation Is it not extremely probable
that those who have given an Account
of this Matter have neglected the [illegible]
[illegible] of the vegetables consider-
ing it as merely designed to free the
[illegible] of the vegetables they perhaps
the inhabitants may have no other
[illegible]

The [illegible] Manufacturers of [illegible]
in [illegible] are in France by [illegible]
[illegible]
[illegible] in the [illegible]

it is a Thing of so great Consequence I shall lay down the most material rules with regard to it.

Of the Manufacture of Nitre

1.- We ought to chuse an earthy matrix already considerably empregnated with putrid animal & veg: Substances as the common Garden-mould To this we must commit as much putrescent Substance as possible & expose this by as large a Surface as possible to the Air since it is so requisite to Putrefaction.

2.- The Air must not on the one hand be too cold nor on the other must the Heat be too great for in the first Case the putrefactive Fermentation would be entirely prevented & in the last the volatile Ammoniacal Salt woud be dissipated

Our Climate in Spring Summer & Autumn with a Northern Exposure is of a proper Temperature for it. ——

3 Tho some degree of moisture in the Air is of use in promoting the Putrefaction yet we must defend our Matrix from Rains which are hurtful I imagine in two ways. viz first by changing the Nature of the putrefactive proceſs since it must be owing to such a Change that there is so much more common Salt produced along with the Nitre in rainy Weather There is always indeed a certain Quant^{y} of the common Salt formed with it so that we must think that it requires only some Variety in the Putrefaction

[illegible] to the Bottom

with a Fahrenheit Thermometer [illegible]

Temperature [illegible]

3. The [illegible] of [illegible] on the

[illegible] of [illegible] the [illegible]

[illegible] before [illegible]

from Rain, which are [illegible]

[illegible]

the Nature of the [illegible]

[illegible]

[illegible]

[illegible] of the [illegible]

[illegible] Further there is [illegible]

[illegible] of the

[illegible] formed with [illegible] than [illegible]

[illegible]

[illegible]

to generate Cm Salt or Nitre. ——

2dly Rain is hurtful more obviously in washing of the Nitrous Ammon: as it forms. ——

4 The Matrix of the Nitre ought to be turned frequently over for two or three Months by which time it will be in a proper State to procure the Salt from it. ——

Qu: Are there any Additions to be made to it? In most Chemical Books a great many are ordered They consist chiefly of other putrescent matters viz Common Salt & Quicklime The use of the first is obvious. With regard to the use of common Salt I doubt not but that it may be converted into a nitrous Salt by the Putrefaction (v.P) & of

Consequence be of Service & I suppose this is the Foundation of a Project they had in France of making Nitre from common Salt alone.

Quicklime is also of Service by promoting the putrefactive Fermentation but any other Calcareous Earth would answer that Intention equally well There is another reason which gives it the Preference we find the Nitrous Ammon: always entangled so much with unctuous viscid Matters that we cant with^{t} difficulty Separate them now the Quicklime may be of considerable Service to render the Separation more Easy in the same way as it assists the Chrystallization of Sugar

When the Nitrous Ammoniac is sufficiently prepared we add to the Earth containing it 1/3 part of the ashes of Vegetables (which yeild a veg: fixt Alk:) & Quicklime for the very purpose just mentioned stratifying em together in a Barrel or Vat & then pour on about half the Weight of the whole maſs of Water Having let this stand for abt twenty four Hours stirring it frequently with a Stick we filtrate the Liquor till it be clear thro Brown-Paper or a Flannel Bag We then Chrystallize this Liquor Separating the Common Salt from the Nitre in the manner we described when on the Chrystallization of Salts (Vid P) & Macquer (Vid. Vol. 1 P. 242).

There are many Combinations by which Nitre may be produced of which we here give a Table as of the other two Salts. —

Table of the ways by which Nitre may be produced

1. Nitrous Acid simple	Veg. Alk simple
2. Nitrous acid simple	Digestive Salt Regener. Tartar Soap of Veg: Alk Earths with soap of Veg Alk
3. Nitrous Ammon: Earths with nitr: Acid Metalls with nitr. Acid	Veg Alk.
4. Nitrous Ammon. Earths with nitr. acid Metals with Nit. acid	Digestive Salt Regen Tartar

Of the properties of Nitre.—

The Chrystals of this Salt which neither melt p^r Deliquium in moist Air or calcine in Dry Air are 6 sided prisms & when we get them very perfect these again terminate at one end in Pyramids of so many sides. In the smaller Chrystals we can frequently observe this.

It is of a middle degrees of Solubility between Vit: Tartar & Glaubers Salt but the different Temperature of its menstruum makes a greater difference in its Solubility than any of the Neut^l Salts

It is of very easy Fusion in the fire By the Application of the Phlogiston it can be decomposed witht first going into the form of a Hepar Sulphuris as we saw by an Expt in the beginning of Part II. — Hale's Experiments shew that contains a great Quantity of fixt Air which during its Deflagration is rarefied & explodes with Violence hence Nitre is the Foundation of all exploding Mixtures particularly Gun-Powder which consists principally of it & Charcoal It probably makes the Charcoal flame in consequence of its Air since we find a pair of Bellows has that Effect on it. — In forming Gun-Powder Sulphur is also added because it

serves to render the Explosion more instantaneous Sometimes they employ a Fixt-Alk: for that Purpose particularly Tartar which makes the Mixture fuse before it explodes & consequently the Inflammation is more readily propagated thro the whole at once.

The fixt Alk: applied to Nitre in fusion explodes also with it But Nitre cannot by the greatest Heat be brought to inflame per se.

Nitre is an Antiseptic but what rank it ought to hold among these we cannot determine for the Exp^{ts} made with reg^{d} to that are not to be depended on.

Of Cubic Nitre.

This is no where a native Substance & I think affords a proof that Nitrous acid is never a native Fossile for if it were as Common Salt is so common in the Bowels of the Earth it woud doubtless often decompose it & form a cubic Nitre. — When I was speaking of the way of getting Fossile fixt Alk: I mentioned one way of forming this Salt viz when we decompose Glauber's Salt by forming it into a Hepar Sulphuris & then Adding Nitrous Acid we might also get it by simple Elective Attract^{n} from Sol Polychrestum of Rochelle but that is very uncommon.

Table of the way in which Cubic Nitre may be procured

1 Nitr. Acid simple	Foss. Alk
2 Nitr acid simple	Common Salt Sal polych of Rochelle Soap of Fossil Alk
3 Nitrous Ammon.	Foss. Alk.
4 Nitrous Ammon	Common Salt Sal polych of Roch.

— Of the properties of Cubic Nitre —

I know nothing in which Cubic Nitre differs from common Nitre unless in the form of its Chrystals which are indeed 6 sided but these sides are of a Rhomboidal figure

We here again are to break thro the order of the Table & treat of common Salt before Sal Digestivum because it is best known & by far of greater Importance.

Of Common or Alimentary Salt.

The Natural History of this Salt was given pretty fully in treating of its Acid It may not however be amiſs to recapitulate it here.

1. It is collected in vast Quantities in the Bowels of the Earth where it is known by the name of Rock Salt or because it is sometimes got in large hard Transparent Chrystals Sal gemmæ These Chrystals are so hard as to bear cutting like real Gems They are however often

of Different Colours as Blue red &c from
a mixture of some metals [illegible]
perhaps they have got the name of
this Art There are mines of Cobalt in
in Bohemia & Hungary so large that
they have employed thousands of
People working in them for a great
length of Time & are not yet [illegible]
being exhausted —

13° The Chrystals of Sal Gemma etc
[illegible] are the purest Salt of any
Common Salt is also laid upon
the Earth in smaller Parcels [illegible]
[illegible] of Stone [illegible] Salt [illegible]
of these we have Instances in Poland
[illegible] the great Quantities
[illegible] in the Seas & which they
[illegible]

[illegible] [illegible] and the [illegible]

of the Pacific & most of [illegible]

[illegible] before the Magellanic [illegible]

[illegible] known to the [illegible] of [illegible]

[illegible]

[illegible] in [illegible]

The Natural History of these [illegible]

[illegible]

[illegible] It may not [illegible]

[illegible]

[illegible] collected in [illegible]

[illegible] of the [illegible]

[illegible] of [illegible]

[illegible]

[illegible]

[illegible]

of Different Colours as Blue red &c from the mixture of some metalline matter & perhaps they have got the name also on that Acct. There are mines of Rock-Salt in Lithuania & Hungary so large that they have employed thousands of People working in them for a great Length of Time & are yet far from being exhausted.

No 3 The Chrystals of Sal Gemmae when transpart. are the purest Salt of any

2 – Common Salt is also laid up in the Earth in smaller Parcels from which it flows out in Salt-Springs Of these we have Instances in Britain

3 – But still the great Reservoir for it is the Ocean & other Seas which communicate with it & hence

it is commonly called Sea Salt. The Origin of it here is disputed Perhaps it is in Part washed out from the mines in the Earth by the Rivers that run into the Sea but I imagine that the principal Source of it is the many animal & vegetable Substances which are continually falling into Decay & putrefying in the Sea being either washed down into it by the communicating Rivers or having been originally Inhabitants of it as Fishes &c. When speaking of the production of Nitre we have already given it as our Opinion that it requires only some Difference in the putrefactive Fermentation to produce Common Salt & this Difference seems to be

a greater Moisture which is the Case in the Sea.

Dr Halley on the Supposition of the Sea's being quite free of Salt at the beginning of the World & imagining it acquired always a new Quantity of Salt in the same Proportion in equal Times by the Solution of it the Earth proposed a very ingenious but fallacious Scheme for calculating the Age of the World. for allowing these Data some Observations made perhaps at present on the Saltness of the Sea & others made 50 or 100 Years after this compared together would determine how much additional Salt it had acquired in that Time & by repeating these once or twice to ascertain the Thing more exactly we might easily find out a Series in Arithmetical Progreſsion which would determine the Age of the Earth. — But in the first Place the Data on which he goes must not be admitted for the 1st is merely Hypothetical & the 2d would not hold good for when the Sea-Water had once a considerable Quantity of Salt diſsolved in it already it would not diſsolve a fresh Quantity in the same Time as if it were applied to it unimpregnated at all. Neither tho his Supposition were just woud his Conclusions follow for the Sea would not have all the Salt it diſsolved acc-

umulated in it because in the 1st Place a great Part is evaporated by the Heat of the Sun as appears by Mr Margrave's Expts on Snow & Rain (even in such an Inland Country as Brandenburg) which discovered a considerable Quantity of Common Salt in these & secondly in warm Climates the Salt of the Sea undergoes a Decomposition since we find that what is found on the Surface of the Sea strikes a red Colour with Syrup of Violets. Besides this the putrefying Substances in the Sea in my Opinion have a remarkable Share as I have already mentioned in producing the Salt in the Sea which must entirely baffle that great mans ingenious Proposal I imagine indeed that the

Saltness of the Sea is allowed to go to no greater Length than is just suffic to prevent the Putrefaction of that vast body of Water. ——

—Of the Manufacture of Common Salt for the Purposes of Life. ——

This is a Subject of the greatest Importance & deserves to be considered with Accuracy & Attention. ——

As we prepare the Common Alimentary Salt for use from Sea-water or Salt Springs the preparation of it depends on the Principles of Chrystallization which is performed with reg to this Salt only one way viz the Demenution of the Menstruum since it is almost equally soluble in cold as in

[illegible]

[illegible] employed from the

[illegible]

[illegible]

[illegible] of the [illegible]

to no greater [illegible]. This is [illegible]

to increase the Destructiveness of [illegible]

and [illegible]

Of the Manufacture of Gunpowder
for the Purpose of [illegible]

This is a Subject of the greatest [illegible]

importance & [illegible]

with the [illegible]

[illegible]

[illegible]

[illegible] the [illegible]

[illegible]

[illegible]

[illegible]

[illegible] of [illegible]

[illegible]

Hot Water. — There are three different means that are employed for this Purpose viz 1st the Heat of the Sun 2dly the common Culinary Heat & 3dly the Action of the Air (which attracts the moisture & watery parts of Bodies in a considerable Quantity). ——

When we employ a great Degree of Heat a Decomposition of the Salt is always the Consequence hence that Salt which is made by the Action of Sun alone or that of the Sun & Air jointly or when a very weak Culinary Heat is applied is always the purest. ——

Sea water besides Common Salt contains other foreign matters from which the Salt must be freed This is done by what is called Clarification in this manner. When the Water is evaporating a Quantity of whites of Eggs Blood or some other Animal Flui is thrown in which coagulates & entangles these matters along with it.——

There are great Varieties in the Alimentary Salt which is used in Diet differing in its goodneſs & purity according to the Methods used for preparing it.——

1st Rock Salt when clear & Diaphanous is as was before observed the purest of any but when coloured by the admixture of metallic matters it is unfit for the Purposes of medicine or Diet.——

2dly In hot Climates into some accidental Reservoirs or Cisterns near the Sea-Shore the water filtrates thro the Sand whic

purefys it & chrystallises in there in a very pure State. This is got from the Cape de Verde Islands particularly the Isle of May & is thence called Isle of May Salt for because it is made like the Bay Salt of Europe by the Heat of the Sun Bay Salt of the Isle of May

3d The Bay Salt of Europe is manufactured in the following manner in Spain Portugal & some parts of France. On the sea-Shore they lay out a sort of broad & shallow Pits or rather Ponds which the sea fills at high Water When they are filled they stop their Communication with the Sea & the Heat of the Sun is great enough in these Countries to Chrystallise the Salt entirely

This is next the Isle of may-Salt for Purity is of a firm Consistence and exactly Neutral for this reason it is used in curing Meat for long sea Voyages This Salt is however of a black dirty Appearance because it is not clarified & undergoes no Filtration like the Salt of the Isle of May & the Salt Ponds have a foul slimy Bottom whereas those in the Isle of May have a sandy Bottom. ——

The British are at no pains to purify this Salt only they buy the dearest & best of it while the Dutch on the other Hand purchase the most impure & prepare from it what may not improperly be reckoned a 4th Kind of Salt & is called by them Salt

upon Salt They diſsolve this impure Bay Salt in their Sea-Water to the Point of Saturation & Boil this Solution till the Clarifying Substance which they add coagulates & then evaporate over a very slow Fire The Dutch are said in the making Salt upon Salt to add an Acid made of Whey or Butter-milk. what Effect this may have I know not as I never saw their Acid But in our own Country Mr Lownes who got a Premium for Purifying Salt used Alumn from which I can find no advantage after repeated trials I indeed never practised with it at large.—

5thly The Springs which are nearly saturated with common Salt by nature (of which England has some) yeild it by Evaporation & this without great Expence might be brought I imagine to as great Perfection as any of the above since the Salt will Chrystallize without much Fire.—Vide

6thly In the Province of Normandy in France where on Acct of the frequent Rains they cannot Evaporate their Salt merely by the Heat of the Sun they join this Operation the Action of the Air & Culinary Heat For they raise Heaps of Sand hard by the Sea which during the Tide are drenched by it & in the Intervall between this & the next Tide the Sun & Air evaporate the Water after having let the Sand acquire as much Salt as poſsible by several returns of Flood they wash it out

by fresh Water & evaporate it with a boiling Heat Much the same Practice has been tryed in England by digging shallow pits near the Sea & allowing the Tide to fill them once then letting this evaporate for some Time & again admitting the Sea & when they have thus evaporated as far as poſsible by the Sun they finish the Proceſs with a boiling Culinary Heat

7thly The Action of Air is more througly applied (in places where the Expence of Fuel renders the sole use of Fire improper) by this Method They make the Salt water fall from a certain Height on a great many small spars of wood boughs of Trees &c which divide it into Particles like rain & thereby afford the largest surface poſsible for the air to be applied to & it is performed under sheds open to all the Winds The Water is raised to the Heighth (from which it is let fall) by Pumps & the Buildings in which these are carried on are called *Batiments de Graduation*. ——

When they have thus submitted the Brine to the action of the Air they finish the Evaporation as in the above method by a boiling Heat & in both therefore the Salt is leſs pure than in the Manufactures before mentioned but they may be improved by using a weaker

degree of Heat. —

8thly In our own Country the Salt is manufactured by the Culinary Heat alone & as the Expence of Time would be too great for a slower Evaporation this Heat is raised to a boiling Point hence our Salt which is commonly used in Diet is the least perfect of any & has its Chrystals of that loose shivery Texture which is the mark of too hasty a Chrystallization. — Our way of manufacturing Salt might be greatly improved. — Vide Dr Brownrigg

These are the most remarkable varieties in the way of preparing Common Salt Let us now see the different ways by which we can judge of its Purity This may be done

1st by its *Colour* which is a milky White in some degree transparent when the Salt is pure.—

2d Its *Taste*.— Pure Salt has an agreeable truly Saline Pungency but when in the least decomposed or mixed with other Salt it has a Bitter Taste Mag: Glaub: Salt is always joined with it in Sea-water & in order to get free of this the Chrystallization is stopt before that begins to Chrystallize & the Liquor which is left in which it is diſsolved is called Bittern by the Manufacturers The stopping the Chrystallization in Time is not sufficiently attended to however & when any of the Mag: Glaubers Salt is intermixt with the Common Salt it infallibly communicates a Bitterneſs.—

By the Legislature of the State [illegible]

Resolved on the Part [illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible] the [illegible]

[illegible]

[illegible]

[illegible]

By [illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

3.– By its *Chrystals*.– Salts when by any means in the least decomposed Chrystallise with Difficulty are less firm & regular in their Form & of smaller Size Hence the firmer the Salt the more Cubes found in it & the larger these are it is the Purer. I explained formerly the manner in which the Chrystals of Common Salt form into hollow Pyramids.——

4 By its *Dryness* When Pure it remains dry in a moderate Temperature of the Atmosphere & does not calcine in a very dry Air Indeed it is seldom so pure as that the last mark takes Place.– I have just now a Specimen of Bay Salt of the Isle of May which I have kept above 7 years without any

sensible Alteration having happened to it— ———

5.— By the <u>Solution</u> of it in Water.— — The Sea-water has a Portion of Earth diffused in it & there is besides during the Evaporation a Part of the Salts converted into Earth. In order to get free of this they Place small Pans in the Corners of the Evaporating Veſsel into which it falls & is then taken out they call it Pan-Scratch There is always besides what they separate in this manner a Quantity adheres to the Bottom of the Veſsel which is called <u>Stone-Scratch</u> In our Salt there is always some of this Earth & when in any considerable Proportion it must have bad Effects.[x] When we

This would counteract in some Measure the chief intent of common Salt viz its antiseptic Quality [illegible] the [illegible]

[illegible] the [illegible] of [illegible]

[illegible] the Petition of

[illegible] the [illegible] in [illegible] these [illegible]

[illegible]

[illegible] the [illegible]

[illegible]

in the [illegible] of the [illegible]

[illegible]

which [illegible] the [illegible]

[illegible]

[illegible]

[illegible]

[illegible]

[illegible]

diſsolve Salt in Water & the Solution is pure & Clear without any Sediment it is free from it & vice versa. ——

6.– By its Neutrality.– That is when no decomposition has taken Place but the Acid & Alk: continue joined in such Proportion as to form a perfect Neutral & will not affect the Colour of Syrup of Violets. ——

7.– By its Antiseptic Qualitys These are so much the Stronger in pure Salt that I am persuaded ℔j of it will go a greater Length in preventing Putrefaction than ℔iii of our common Table-Salt & by this we may see how we could afford to purify our Salt for the Purposes of keeping Meat. ——

Of the Properties of Comm:n Salt

The Form of the Chrystals of this Salt is that of an exact Cube when the Chrystallization is carried on with suffic: Exactness. When thrown into the Fire it decrepitates like Vitr: Tartar. It dissolves easily in Water & that equally well whether the Water be cold or hot. ——

It is not so fusible as Nitre nor so refractory in that respect as Vitr: Tartar. It may be decomposed by the Force of Fire alone by the Add:n of the Phlogiston or in general by Elect: Attraction. The Strength of its Antiseptic Powers is very undetermined & I cannot here shun tho very unwillingly to point out a Piece of Inaccuracy whi

the ingenious Dr Pringle has fallen into in aſsuming Common Salt for the Standard by which he judges of the Antiseptic Qualities of other Bodies Nay he even uses Table-Salt which is the least pure of any & varies every Time it is prepared according to the force of Fire that has been employed the Time it has been kept on that Fire & the Pains that have been taken to separate the Scratch I can also see a Fallacy that the same ingenious Author was liable to in concluding that common Salt in a small Proportion was Septic for a very small Quantity of it will have no Effect on a conſiderable Proportion of Fleſh & then the Impure Salt which he seems to have used contained a good deal of Absorbent Earth that is septic by his own Experiments & the Septic Effects he observed might have been owing to this.

A Table of the Diff^{t} Artificial Combinations that may be used to procure Common Salt.

Of Digestive Salt.

Commonly this Salt is called Sal Digestivum Sylvii or Sal Febrifugum Sylvii because that Physician of Holland brought it into medic^l use in Fevers.

It is never the Produce of Nature but may be formed by various Combinations.

A Table of the Combinations which may produce Sal Digestivum

Boerhaave in his Proceſs for making the Digestive Salt names it very improperly Sal Marinum Regeneratum since it is formed by a differ^{t} Alkali from Common Salt. The Colledge of Physicians at London have avoided this Impropriety by giving it the name of Spiritus Salis Marini Coagulatus.

Of the Properties of Digestive Salt

Its Chrystals like those of Common Salt are Cubes & can be got solid & firm much more easily I know not any difference between this & Common Salt. — Chemists have fancied there are differences but the Exper^{ts} brought to prove such a Notion are not Satisfactory. Indeed I am inclined to think there is some Preference due to it in point of Medicinal Properties tho nothing certain can be said in Support of this.——

Of Regenerated Tartar.——

There are not the least Grounds to suspect that this is a native Substance. It is always the Product of Art & there is not a Neutral for the making of whic more Care is requisite The Best directions for this Purpose are those in the London Dispensatory. As it seems scarcely to admi of Chrystallization we get it by Evaporation to dryneſs & in this Proceſs a Portion of the Acid is diſsipated which we must be careful to supply by the addition of a new Quantity before the end of the Evaporation The Vegetable acid employed in forming Regenerate Tartar is always Vinegar which is a very heterogeneous Fluid & consequently

the Salt procured is never of a pure Saline Colour on acc^d of some foreign matters adhering to it. These should be separated & then the Colour will become better. This may be done by a kind of Calcination or continuing the Heat after all the water is evaporated till the Salt is in fusion & for some Time after. It requires however great Nicety to know the exact length that this should be carried D^r Pemberton has given the best directions how we may judge of the proper degree of Calcination.- Vide his Dispensatory

It may also be purified by throwing it into Alcohol which diſsolves the Salt (see below on it properties) & leaves the oily matter united with it

NB One mark of the Calcination being carried far enough is that the Oil separates in the same way by diſsolving it in Water. ——

I have hinted before that there is reason to think that different Neutrals are produced by the other veg: Acids but the properties in which they differ are not well ascertained. —

The Salt produced by the native Acid & the veg: fixt Alk: (a medicine of considerable use) called Tartarus Citratus a Saline Mixture was imagined by Boerhaave to be the same with Regenerated Tartar & he thought that might be substituted in its Place but I believe that they differ not only in their Chemical but also

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in their Medicinal Virtues For one thing the Salt made of the juice of Lemons or Tartarus Citratus as it is called when rendered Solid is of a much stronger harder Texture than regenerated Tartar When on the Subject of the veg: Acids we took notice of the difference between the Soluble Tartar (which is composed of the acid of Tartar ~~& the veg:~~ & the veg: fixt Alk:) & regenerated Tartar. Vinegar applied to that Salt decomposes it and so does the acid of the Stomach so that its Effects as a medicine which have been so highly cried up cannot be at all relied on in People who have a great Deal of that Acid in their Stomachs When we order it we should give absorbt Powders along with it to hinder this Decomposition

Of the Properties of Regener: Tartar

The regenerated Tartar is collected in a leafy foliated Texture (called on that acct sometimes Terra foliata Tartari) & is remarkably deliquescent. It even appears to be so tho we have it in a Chrystalline Form & seems in that respect to be an Exception to all the other Neutrals.x ——

It diſsolves in a very small proportion of Water & generates Heat with it. ——

— It is easily fusible in the Fire

It differs from all the Neutral Salts already mentioned in being Soluble in Spirit of Wine. It promotes the

+ probably this is owing to too quick a Chrystallization as I have seen some Chrystals of it obtained by a slow Evaporation which stood the Air withou any tendency to Deliquescence or Calcination.

Operation of that Fluid on gummy & resinous Matters & renders oils in some measure soluble in it & hence has with some propriety been called by the Chemists a Saponaceous body for it also brings Oils into a kind of Union with Water.

It also promotes the Action of Alcohol on Metals when precipitated in the Form of Calces from Acids & on this Principle Mr Geoffroy made an Aurum Potabile so much desired of old & apparently of so little consequence in Medicine.

It may not be improper here to suggest a Notion which we shall find confirmed by the Account of the Ammoniacal Salts viz that such Neutral Salts are soluble in Ardent Spirits as are deliquescent which we see is the Case with Regenerated Tartar. The particular properties of the Neutral Salts formed by the other kinds of veg: Acids are not at all ascertained so that nothing can be here added relating to them.

Table of the Combinations we may form Reg

Of the Physician of [illegible]

[illegible]

[illegible] discovered by [illegible]

[illegible] of [illegible] & [illegible]

the name of Physician of [illegible]

[illegible] of it was [illegible]

[illegible] for some time [illegible]

[illegible] of [illegible] & the [illegible]

[illegible] & [illegible]

[illegible] on the [illegible]

[illegible] not so easily [illegible]

[illegible] from [illegible]

[illegible] Tender

[illegible] of [illegible]

[illegible] so far [illegible]

[illegible]

Of Sal Polychrestum of Rochelle—

This Salt is but very lately known It was discovered by Saignette an Apothecary of Rochelle & hence it has got the name of Polychrest of Rochelle.— The Composition of it was kept a Secret for some Time It is formed by the acid of Tartar & the foſsil Alk: It chrystallizes & keeps dry or rather calcines in the Air. ——

It is not so easily soluble in Water nor does it fuse so readily as regenerated Tartar. ——

It is not soluble in Spt of wine.—

About 30 Years ago it was in high repute as a Medicine but it is now quite laid aside because it is of as easy Decomposition as Soluble Tartar

The old Physicians in England however use it to this Day because it was in high repute when they began to practice. —

There is no particular name given to the Combination of the foſsile fixt alk: with the other veg: Acids as Vinegar. ——

—— Table of the Combinations by which Sal Polychrest: of Roch: may be formed

[illegible] patched the eight [illegible]
[illegible] from the [illegible]
[illegible]
[illegible] commenced [illegible]
[illegible] the [illegible]
[illegible] Amazon [illegible]
[illegible] the [illegible]
[illegible] have been [illegible]
[illegible] of [illegible] on the [illegible]
of [illegible]

[illegible]
[illegible]
[illegible]

[illegible]
[illegible]
[illegible]
[illegible]

The [illegible] [illegible] [illegible] [illegible] [illegible]

of the [illegible] [illegible] [illegible] of [illegible] [illegible]

[illegible] [illegible] they began to [illegible]

There is a [illegible] [illegible] same [illegible]

[illegible] of the [illegible] [illegible]

and the other [illegible] [illegible] [illegible] —

[illegible] [illegible] [illegible]

[illegible] [illegible] of [illegible] [illegible] [illegible]

Having now finished the eight neutral Salts that arise from the Combination of the two fixt alk: with the four acids we proceed to the Ammoniacal Salts which are formed by the Volat: Alk: & we shall begin with Common Ammon: tho it is not the first in our Table because its Nature & Properties have been most attended to & it is of more universal use than ye rest

Of Common Ammoniac.

The Origin of common Ammon: was long uncertain What was called by the Ancients by that Name was undoubtedly common Salt.

The Ammoniac was always imported to us from the Levant & many Opinions were formed of the means by which they procured it there.

Some were of Opinion that it was a foſsile Substance & related that it was got in Volcano's & there is no Question but it may be got in these since there is so much inflammable matter consumed in them (tho Hill absolutely denies it) But it cannot be in such Quantity as to become a branch of Trade. — Others thought it was extracted from Urine & some pretended to affirm that it was made of a Combination of Common Salt Urine & Soot. — The Industry of the French has now discovered that it is there procured entirely from Soot & the Soot of Cows Dung (because that is the common Fuel by a particular Sublimation. —

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However not only this but the Soot of any other inflammable Matter yeilds it & it is manufactured in Edinburgh from that of our Pit-Coal with great Advantage. The particular method is a Secret with which I am not acquainted.- Because this Salt is found in several Places of the Earth where there are Volcano's as near Mount Vesuvius we cannot Infer that it is a native Substance Tis undoubtedly the product of the Inflammation in these Volcano's.—

There is a fine Illustration of this in the Country near Dysart where there have been some Coal Mines burning for many years In the fiſsures of the Earth where the Smoak iſsues out there is a very fair Sal-ammoniac found.—

By the common Practice of burning Bricks in what is called Clumps there is always some Sal Ammon: produced between the Cracks of the Clay which covers the sides & Top of the Clump.- It is my Opinion that Sal Ammon: is always procured from Soot which is the Product of Inflammation & it would appear from thence that the Acids are all converted by inflammation into the muriatic.

+ Those that I have seen have had but 4 Points but some have aſserted they have 6 Points.

Of the Properties of Common Ammoniac

Its Chrystals are of the Form of a Star & resemble Ice or Snow It is deliquescent in moist Air but however readily assumes a dry & concrete Form It is brought to us in Cakes but this is not its natural Form of Concretion it requires 3^{ce} its weight of Water to suspend it It differs from those of ⊖ & ⊖ as it dissolves in Alcohol and fuses in a gentle heat in which it rises entire in Flowers without any Decomposition for which reason we purify it by Sublimation.

Of its Properties with regard to other Bodies

These are not well ascertained it seems to have its Effect here by suffering a Decomposition so that it is its Acid or Alkali that produces this Effect & not the Sal ammoniac It volatilizes other Matters but probably from the Muriatic Acid which has the greatest Power in Volatilizing Matters of any Acid whatever.

Of Vitriolic Ammoniac.

The Vitriolic Ammoniac is always also a production of Art It may arise from various Combinations from more indeed than any of the other Ammoniacs because its Acid has a stronger Force of Attraction.

I mentioned on the subject of the Volatile Alk: that Vitriolate Tartar was convertible into it by means of Alcohol or Oil.

Of its Properties.

It is easily got in hard dry Chrystals which do not deliquesce & are of difficult Solution in Water. It is not Soluble in Alcohol & therefore confirms the Opinion that only deliquescent Salts are so

Alcohol precipitates it from Water— On long standing tis to be observed that it seems to give out its acid to the Alcohol It was first discovered by Glauber who ascribed to it great Virtues as he did indeed to all of his Discoveries but his account of it is couched in such mysterious Language that we can hardly understand it & no other Person has found such remarkable Properties in it. He particularly attributes to it surprizing Effects on Metals but I imagine these depend entirely on its Acid He kept it a Secret & accordingly we often find it mentioned under the Name of the Secret Ammoniac of Glauber.— It may be decomposed by the fixt

Alk: or by forming it into a Hepar Sulph: & adding an Acid to it. ——
Hoffman tells us that its Alkali may be got by the Force of Fire alone. This I have never been able to execute but it is much to be wished for as it would give a Caustic Volatile Alkali much more easily than we get it by Quick-lime in the same Way as the Salt of Urine does. ——

Of Nitrous Ammoniac. ——

This Salt is produced also by some Combinations & I believe by means of Inflammables like the last. ——
The manner in which it is produced by putrescent Vegetables is fully shewn on the Subject of Nitre It is never native. ——

[illegible] [illegible] by [illegible] [illegible] [illegible] [illegible]
[illegible] of Deed [illegible] [illegible]

Ejectment Rule as that the [illegible] [illegible]
[illegible] by the Terms of the Above [illegible]
I have known them held to warrant [illegible]
it is meant to be availed of [illegible]
give a Parish a Settlement which the [illegible]
[illegible] made there [illegible] of by Deed [illegible]
in the same Way as the Case of [illegible]
[illegible]

Of Natural Immunities

They Rule as followed that the [illegible]
[illegible] [illegible] by [illegible]
of [illegible] like the [illegible]
The [illegible] [illegible] of [illegible]
[illegible] [illegible] [illegible]
in the [illegible] of [illegible] It is [illegible]
[illegible]

Of its properties.

The Nitrous Ammoniac aſsumes a leſs solid Concretion than even the common Ammoniac It is very deliquescent & diſsolves easily in Alcohol.

It is also of very easy Solution in Water Hoffman ascribes great medicinal Virtues to it combined with Camphor or eſsential Oils.

Its most remarkable Property is that it inflames & explodes per Se which shews how difficult it is to aſsume a general Characteristic of Bodys since this contradicts that of Saline Substances.

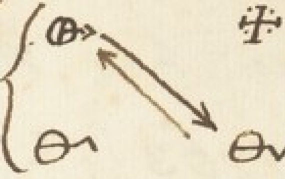
It is decomposed as Common Ammoniac

Of Vegetable Ammoniac. —

This Salt may probably be of as great Variety as the Veg: Acid but we have only taken notice of it as formed from Vinegar & Volat: Alk: when it commonly gets the Name of Spiritus Myndereri & on Acc^t of the dilute State of that Acid is always fluid & diffused in Water. Some Experiments show that it may be made solid by Distillation & some propose to add Vinegar to the Offa Helmontii which renders it solid but both these methods may be called Contingent & expensive I think the most Eligible method is to form it for that Purpose by an Elective Attraction for Instance with the other Ammoniacs & regenera

It is very easily proc^{d} in a s^{d} form by a double election Attr^{n} by mixing Vitr: Ammn w^{t} Regen Tart or rather S: Regn
and apply^{g} Heat w^{t} raises the vol^{e} acid and alk in a concrete form

ated Tartar particularly by joining that Salt to y^e Vitr:^{lic} Ammon: & then a Veg: Ammoniac will be sublimed by the Fire The proportions of both are uncertain but I would add more than an equal Part of Vitr:^{c} Ammon:



—Of the Properties of Veget: Ammoniac.—

As it is so difficultly got solid we may conclude that it is easily soluble in Alcohol & perhaps it might be Chrystallized from this in a purer State.— The small Quantities that can be procured of it in a solid Form render it impossible to say any Thing of what Change that makes on its Properties.—I have seen a Medicine of Wards which he gave for resolving hard indurated Testicles which I always imagined to be this

Salt (tho I do not find it mentioned in his Receipts published in February 1763) & I have found it useful in such cases myself ———

It is not improbable that it may have the same Effect as regenerated Tartar in rendering Essential Oils Gummy & resinous Bodies soluble in Alcohol & likewise in dissolving metallic precipitates. ———

We have now given the Chemical History of the 12 Neutral Salts composed of the four Acids & three Alkalies The other Compound Saline Substances are to be left till we treat of their other constituent Parts viz the Earths & Metals & such simple saline Substances as seem to differ from those mentioned

already such as the Acid of Phosphorus &c we have also chosen to defer till we treat of the Substances from which they are got But there is one Saline Substance about the Nature of which the Chemists were long in the Dark that we shall here consider because it will no where else occur so properly I mean Borax

Of Borax

The Origin of this Substance is uncertain as indeed is that of all the Substances which come from the Inland Parts of the East Indies like this. —

Some tell us it is got from Mineral Waters which flow near Copper Mines & after that undergoes a particular but unknown Operation It certainly also undergoes some other Operation in Europe about which we are as uncer

-tain Others think that it is merely an artificial Production It would be of great Importance to know if it is because it is of so considerable use & of so great Expense when Imported. ——

As great Uncertainty long subsisted about the Nature of it & what Claſs of Bodies it should be ranked under. It was taken for an Alkali because it turns Syrup of Violets green & precipitates Metals from Acids However it would seem these marks are not entirely confined to Alkalies There are other Bodies that change the Colour of Syrup of Violets green & Borax is now known for certain to be a Neutral Salt consisting of the Foſsil Alk: & a peculiar Acid which we have already mentioned under the Name of Sedative Salt of Homberg It was discovered by a casual day May 12th

V

Experiment of that Authors & he gave it the Name of Sedative from its supposd medical Effects. This Sedative Salt he got by adding Green Vitriol to Borax & subliming it but we now know that the Vitr. Nitrous Muriatiac & Vegetable Acids will all decompose it however that is but a piece of Curious knowledge for in Practice we can only conveniently use the first mentioned This makes it sublime in so small a Quantity that frequent Cohobations are necessary in order to get all the Acid. But as this is expensive we have of late learnt that by means of adding Vitriolic Acid & Chrystallizing we can get it for the Sedative Salt forms in flakes on the Surface This can be freed from some

Vitriolic Acid that Adheres by adding Water afterwards. – The French Chemists indeed think this different from what is got by Sublimation but I can perceive no odds but that it is firmer & perhaps of greater specific Gravity. ——

NB I myself have repeated the Sublimation of it Eleven Times & each Time still got a new Quantity. ——

Of the Properties of Sedative Salt

The Sedative Salt forms into thin leafy Chrystals which are pretty firm & hard not deliquescent & not soluble in cold water. In hot Water it is soluble as it is in Alcohol which is an objection to the Opinion of Deliquescent Salts alone being Soluble in it. ——

When burnt with Ardent Spirits it

[illegible] that [illegible] for [illegible]

[illegible]

[illegible] the different forms [illegible]

[illegible] that I [illegible]

[illegible] that it is proper to [illegible]

[illegible]

[illegible] enough have [illegible]

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[illegible] of [illegible]

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[illegible] the [illegible]

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gives a blue Colour to the Flame In the fire it fuses & is converted into a Glaſsy Maſs but it is no other way alterd in its Properties It is very fixt *per se* but by the addition of Water becomes Volatile.

Homberg took notice of all these Properties but he was ignorant of its being an Acid which is now put beyond Question. For it effervesces with Alkalies & forms Neutrals with them. We have already mentioned that any of the acids Decompose these so that its force of Attraction is smallest of any. This destroys a Theory which one would be very apt to form from the History of the other Acids that their force of Attraction depends on their Volatility (which is probably owing to the Presence of a mephitic Air) Thus the Vol: Vit: Acid has less Attraction than either of the Fixt or the Nitrous or Muriatic because it is evidently more Volatile & has a greater Quantity of Mephitic Air joined with it. The Nitrous Acid has again less Attraction than the fixt Vitriolic & is more volatile (& both these also seem to owe this to Mephitic Air) But this Acid of Borax has less Attraction than either of the three & is much more fixed than any of them As to the Properties of Borax itself we have seen already such as made it be thought an Alkali. - It has great Power in the Vitrification of all vitrescent Matters More than either of the fixt

Alkalies so that its Operation in that respect is not to be ascribed to its Alkali & besides the Acid has some Effect in the same way. — As a Step towards Vitrification it promotes Fusion remarkably & this is the reason why we wish so much to have it Cheaper Perhaps indeed it might be feared that its Acid would act on the Metalls & corrode them But I see no Appearance of this in those that have been fused by it.

F II Of Inflammable Bodies in general.

The Idea of Inflammability ought to be properly settled before we enter upon the particular Inflammable Bodies & for that reason we shall recapitulate what we said with regard to it in Part I.

A Body then may be called inflammable when on ye contact of a burning Substance it catches Fire in the Part immediately touching that Substance from whence the Fire is propagated over the whole maſs till it is entirely consumed or the greater Part of it & the rest reduced to Ashes Some are inclined to think that Flame or a Luminous Vapour

floating on the Surface of the burning Body is a constant attend^t & universal mark of Inflammation but we cannot admit this since we find Charcoal has the Fire propagated from a small Part over the Whole & is consumed by it which undoubtedly gives it a Place among inflammable Bodies & yet it emits no Flame from its Surface. Indeed it may be answered to this that a Stream of Air blowing on Charcoal makes it flame but we know not but there are other bodies in the same Conditions with Charcoal on which the Air will not have that Effect.

Among the great Variety of inflamm=able Bodies we formerly observed that there are only properly three that deserve that name. viz Oils Ardent Spirits & Sulphur & that the rest all derived their inflammability from the presence of one of these in their Composition. — It has been imagined however that we may add to these an inflammable Vapour or Air. But I believe this only differs from Oils or Ardent Spirits as the Vapour of Water does from Liquid Water. I will not however positively afsert that there is not an Inflammable Air which, is permanently in that Form. ——

On the other hand the two last kinds which we have mentioned were for some Time thought to owe their Inflammability to an Oil which they contained because there is some appearance of Oil in ard^t. Spirits & Sulphur consists of Vitr: acid & some inflammable matter which

was supposed to be an Oil This Notion is now however doubted tho they still attribute the Inflammability of all the three to one common Principle which differs in its Nature from any of them This Principle has never been shewn by itself It is rather imagined than known tho there is indeed great Probability in Favour of its Existence It is called in Chemical Books the Phlogiston.—

NB We sometimes find all inflammable Bodies in general very improperly named Sulphureous.— Ignition differs from Inflammation as in the first the body turns red hot but by removing the Fire it gradually cools without any Change or loss of Substance Vide P. I on Inflammables

Of Oils.

It were useleſs to repeat here the general Definition of Oils They are divided into Veg: Animal & Foſsile & the two first are subdivided again into Expreſsed Eſsential & Empyreumatic. These we shall consider first in the animal & then in the veg: Kingdom. ———

Of Expreſsed Animal Oils

It may be a Question whether the expreſsed Oils of Animals are taken in with their Food & remain in their Body unchanged or are prepared by certain Organs of the Body However this be they are deposited in the Cells of the Pars Cellularis & in order to procur them we are obliged either to burst those

Cells by the Elastic Force of Boiling Water or to Cut & divide them by Mechanical means & then melt them out by a gentle Heat.

Of their Properties.

These Oils have no peculiar smell & are of a mild Taste In the body they are Fluid but concrete out of the body in the form of Suet Fat or Tallow.

Exposed to the Air they are liable to a kind of Fermentation by which they acquire a dissagreeable Odour & Taste & thinner Consistence I call this a Fermentation because a small portion of Oil thus changed if added to a Quantity that is fresh will act as a ferment & change it into the same Nature It cannot properly be reckoned of any of the three kinds of Fermentation viz Vinous Acetous or Putrefactive & therefore is justly termed *Rancescency* & the Oils thus changing are called rancescent. — A Question may here arise whether this rancescency is not owing to some foreign matter mixt with them Such an Opinion is supported by this that Butter which is an Oil of this Kind & liable to rancescency when freed of its mucous or cheesy Part is leſs & in the same manner other Oils by frequent Ablution with Water get a purer Colour & are leſs rancescent so that one would think this Fermentation proceeded intirely from the Presence of some mucous Matter Too great a degree of Heat used in procuring these Oils also changes their Nature in a Manner

we shall soon mention & the whole Arts employed about depend on the means of preventing their rancescency & applying a proper Heat to them. —

As to their relation to other Bodies.

1 Saline | The Vitriolic & Nitrous Acids unite with them & we said formerly that it was probably of the Nature of Acid in general to do so & that the others do not because of their Dilution. —

This Combination has been called Soap but it does not appear that the proper character of Soap belongs to it because very little of the Oil can be united with Water by this Means. —

The Alkalies form a real Soap with them but as they do so with all the other Oils we shall defer speaking of that Compound till we have finished the Oils. — They do not unite with the Neutrals that are properly chrystallized but if we add an expreſsed Oil to the Nitrous Acid & after that put in an Alkali the nitrous acid & it will unite without throwing out the Oil & the Compound will be soluble in Water

2 The other Inflammables| They unite with the other Oils but this only I imagine in the way of Solution & not proper mixture. ———

They do not Combine with Alcohol With Sulphur they unite & form Balsam of Sulphur. ———

3. Metals| They diſsolve Lead & its Calces & are said also to diſsolve Tin Copper is acted on by them especially in their rancid state. In which

State also they induce some Rust on Iron So that Homberg very properly desires to add Camphor as a strong stopper of rancescency to the oil we use to preserve the Steel Instruments They bear no relation to Earths or Water We shall have afterwards an Opportunity of considering their Effects on Animal Substances.

Of the Changes induced on them by the Action of Fire.

It has been said that no Change will be induced on these Oils by a heat under that of Boiling Water or even by that When it is above they are rendered thinner & do not concrete again when cold but imagine the same Effects will ensue if they are kept for any considerable Time in a Heat greater than that of the human Body When expressed Oils are subjected to what is called the chemical Analysis or a Distillatio per se We get over first a Quantity of Water then some acid & after that if urged with more Heat they rise themselves at first little changed either in Colour or Consistence but turning for some Time thinner & darker in Colour they become at length black & again of a very thick Consistence. Whatever expressed Oil is thus subjected to the Chemical Analysis It yeilds the same This black Oil on Acct of its burnt Smell is called Empyreumatic so that we are naturally led to give an Account of the properties

Of Empyreumatic Animal Oils

They can be procured not only by the Distillation of expressed Oils but that of

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[illegible]

Commenced [illegible] Spectators [illegible]

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Brimstone and Burning for which [illegible]

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[illegible] of the [illegible]

[illegible]

any Animal Substance.

They are of a thick Consistence black Colour peculiar diſagreeable Odour & Acrid Taste:

They unite with Acids producing Effervescence & Heat even to the Degree of Inflammation.

They are also soluble in Alcohol & unite with other Oils & with Sulphur

The Effects of these Empyreumatic Oils have not been taken Notice of farther with respect to other Bodies.

If they are again distilled they become thinner of a lighter Colour leſs odorous & leſs acrid A third Distillⁿ has the same Effects in a higher Degree & by repeating it ten or twelve Times the Oils are rendered extremely thin, limpid, & Volatile & get the Name of *Oleum Animale*

A French Chemist tells us he can get the Oleum Animale by only two distillations as refined as it is commonly by a Dozen but does not favour us with the particular means he uses tho it would seem to be the Addition of Æther. Some have proposed to join Quicklime to facilitate the Preparation of it but I imagine it would have the contrary Effect. ——

This Oleum Animale must be used recently prepared for when kept for any Time it loses its Limpidity &c. ——

Of the Essential Oils of Animals

This Class of Oils is not entirely confined as Mr Macquer seems to think to the Vegetable Kingdom There are a few Instances of Essential Oil in the Animal as Castor & Musk but their peculiar Properties we shall explain when we come to vegetable Oils of the same Class

Bethesda
Potuosa

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2

day May 12th

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Alkali

Its na History.

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have a sme like that of the