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NOTES

ON SOME OF THE

CHEMICAL REACTIONS OF

NARCOTINE AND MECONIC ACID.

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In the present article it is proposed to give some of the chemical reactions by which two of the *proximate principles* of opium may be recognized. The method of applying the tests is the same as that given in previous articles in regard to various alkaloids.

Narcotine.

Pure crystallized narcotine was dissolved in water, just sufficiently acidulated with hydrochloric acid to effect solution, and the reagents were applied to a grain of this solution.

1. Potash.

1. $\frac{1}{100}$th, grain of narcotine in one grain of water, when acted upon by a small drop of potash solution, gives an immediate copious white amorphous precipitate, which is insoluble in excess of potash, but dissolves readily in a few drops of strong acetic acid.

2. $\frac{1}{1000}$th, gives an immediate white amorphous precipitate which after some little time is changed into beautiful groups of branched crystals which are very characteristic.

3. $\frac{1}{5000}$th, an immediate precipitate, which very soon is crystalline. If there be much excess of the reagent, the precipitate will not be produced.

4. $\frac{1}{10000}$th, an immediate cloudiness, which almost immediately becomes crystalline, and after a little time there is a rather abundant deposit of aciculated and branched crystals.

5. $\frac{1}{20000}$th, a perceptible cloudiness, soon much the same as in 4.

6. $\frac{1}{40000}$th, only a faint cloudiness at first, but very soon there is a deposit of aciculated crystals, which when examined by a microscope are rather abundant. In applying the reagent to solutions as dilute as this and the one preceding, it is necessary to use the least possible quantity, otherwise there will be no deposit.

2. Ammonia.

1. $\frac{1}{100}$th, grain of narcotine gives with ammonia an immediate white curdy precipitate, not readily soluble in excess of reagent, but readily, in a few drops of strong acetic acid. After a little time the precipitate becomes crystalline, the crystals having the same form as those produced by potash.

2. $\frac{1}{1000}$th, much the same as 1.

3. $\frac{1}{5000}$th, an immediate cloudiness, which very soon becomes crystalline; to obtain the ppt. the least possible quantity of reagent must be used. By suspending, for a few moments, a drop of ammonia over the narcotine solution, the latter is covered by a white cloudiness, which very soon becomes crystalline.

4. $\frac{1}{10000}$th, by applying the vapor of ammonia, no cloudiness is produced, but soon there is a very good deposit of crystals.

5. $\frac{1}{50000}$th, by using a small quantity of the ammoniacal vapor, there is soon produced a pretty fair deposit.

The carbonates of potash and ammonia, behave in the same manner as the alkalies. Several specimens of iodide of potassium gave, also, the same reactions, and the same crystalline form.

3. Chromate of Potash.

1. $\frac{1}{100}$th, gives an immediate copious yellow amorphous precipitate, which is readily soluble in acetic acid.

2. $\frac{1}{1000}$th, a yellow precipitate, soon crystals, same as produced by potash.

3. $\frac{1}{5000}$th, much the same as 2. Much increased by stirring.

4. $\frac{1}{10000}$th, no immediate precipitate, but very soon a good crystalline deposit, especially by stirring.

5. $\frac{1}{30000}$th, in a few minutes a quite perceptible crystalline precipitate.

4. Bichromate of Potash.

1. $\frac{1}{1000}$th, gives an immediate copious yellow amorphous precipitate, which after some time becomes granular. The precipitate is soluble in excess of acetic acid.

2. $\frac{1}{3000}$th, a light yellow precipitate, very soon granular.

3. $\frac{1}{10000}$th, no indication after some time.

5. Sulphocyanide of Potassium.

1. $\frac{1}{1000}$th, gives a white amorphous precipitate, soluble in acetic acid; the precipitate does not become crystalline by standing.

2. $\frac{1}{10000}$th, very soon, especially by stirring, a deposit of groups of prismatic crystals.

3. $\frac{1}{30000}$th, much the same as 2.

4. $\frac{1}{100000}$th, after a little time by stirring, quite satisfactory.

6. Ferrocyanide of Potassium.

1. $\frac{1}{1000}$th, gives an immediate dirty white amorphous precipitate, which dissolves in an excess of reagent, but is reproduced upon the further addition of the reagent. The precipitate is readily soluble in acetic acid.

2. $\frac{1}{10000}$th, gives a permanent precipitate with an excess of reagent.

3. $\frac{1}{50000}$th, a pretty good precipitate.

4. $\frac{1}{100000}$th, upon agitation gives a good cloudiness.

5. $\frac{1}{200000}$th, no indication after several minutes. None of the above deposits become crystalline.

7. Ferricyanide of Potassium.

1. $\frac{1}{1000}$th, gives a bright yellow amorphous precipitate, permanently soluble in excess of reagent.

2. $\frac{1}{5000}$th, by using a small quantity of reagent, a quite perceptible precipitate, readily soluble in excess.

8. Carbazotic Acid.

1. $\frac{1}{1000}$th, gives a bright yellow precipitate which does not crystallize upon standing.

2. $\frac{1}{1000}$th, a greenish yellow precipitate, soluble in excess.
3. $\frac{1}{10000}$th, gives a quite obvious amorphous deposit.
4. $\frac{1}{20000}$th, a just perceptible cloudiness.

9. Terchloride of Gold.

1. $\frac{1}{100}$th, gives an immediate yellow amorphous precipitate, which nearly all dissolves upon heating, leaving a few orange gum-like masses; upon cooling the precipitate is reproduced. There is little or no reduction of the reagent upon the application of heat; in this narcotine differs from morphia.
2. $\frac{1}{1000}$th, gives a good yellow precipitate which does not all dissolve in several drops of potash solution, nor does the solution darken as in morphia. The precipitate is soluble in several drops of acetic acid.
3. $\frac{1}{10000}$th, gives a good greenish yellow precipitate.
4. $\frac{1}{20000}$th, very soon gives a quite perceptible precipitate.
5. $\frac{1}{40000}$th, only perceptible, not satisfastory.

10. Bichloride of Platinum.

1. $\frac{1}{100}$th, gives a light yellow amorphous precipitate, which nearly all dissolves by heat, and is reprecipitated upon cooling.
2. $\frac{1}{1000}$th, a pretty fair precipitate.
3. $\frac{1}{250}$th, no indication.

11. Tannic Acid.

1. $\frac{1}{100}$th, gives only a slight dirty white precipitate.

12. Acetate of Potash.

1. $\frac{1}{100}$th, grain of narcotine gives with acetate of potash, an immediate copious white amorphous precipitate of acetate of narcotine, which readily dissolves in a drop of strong acetic acid, but is insoluble in excess of reagent. After a little time the precipitate becomes crystalline, giving beautiful groups of acicular crystals which radiate from a common centre.
2. $\frac{1}{1000}$th, gives a distinct cloudiness, which very soon changes to a rather abundant deposit of branched crystals, and ultimately as in 1.
3. $\frac{1}{3000}$th, no immediate deposit, but very soon crystalline needles appear, and after a little time there is a very good precipitate.
4. $\frac{1}{10000}$th, in a few minutes crystals appear.
5. $\frac{1}{20000}$th, in less than ten minutes needles begin to form along the edge of the drop, and in a little time the deposit is very satisfactory.

The *acetates of baryta, zinc,* and *lead,* give much the same reactions in a hydrochloric solution of narcotine as those given above for the potash salt. In the first, second and third solutions, no difference is observed; in the fourth, the precipitate is more slow to appear, and perhaps not so abundant, especially when the lead salt is used the deposit does not appear for several minutes: in the fifth case, the same difference was observed between the potash salt and those of baryta and zinc, and no crystals were observed in the lead solution after standing one hour.

The above reactions point out a new test for acetic acid, however, we might state that the acetate of narcotine, when produced from the baryta or potash salt, is somewhat soluble by a solution of chloride of narcotine.

13. Iodine in Iodide of Potassium.

1. $\frac{1}{100}$th, gives a copious red brown amorphous precipitate, which is soluble in several drops of strong acetic acid, but not readily, in a large excess of potash. An excess of reagent should be used, otherwise the precipitate, first produced, will be dissolved.
2. $\frac{1}{1000}$th, much the same as 1.
3. $\frac{1}{10000}$th, a brownish precipitate, which dissolves in a drop of potash solution without the production of a white one as in strychnia.
4. $\frac{1}{30000}$th, a brown yellow precipitate, quite copious.
5. $\frac{1}{50000}$th, a good green yellow precipitate.
6. $\frac{1}{100000}$th, by allowing a drop of the reagent to flow into the narcotine solution, a very perceptible precipitate is produced.
7. $\frac{1}{300000}$th, in about a half minute, the precipitate is quite obvious.
8. $\frac{1}{500000}$th, the precipitate is still perceptible.

14. Bromine in Bromohydric Acid.

1. $\frac{1}{100}$th, gives a copious bright yellow precipitate, which soon dissolves if there is not an excess of reagent.
2. $\frac{1}{1000}$th, the precipitate is readily soluble in potash, but is immediately replaced by a white one.
3. $\frac{1}{10000}$th, much the same as 2, but only a trace of white precipitate.
4. $\frac{1}{20000}$th, a dirty yellow precipitate.
5. $\frac{1}{30000}$th, gives a green yellow precipitate.
6. $\frac{1}{150000}$th, gives a quite obvious precipitate.
7. $\frac{1}{250000}$th, the precipitate is still perceptible.

15. Sulphuric and Nitric Acids.

1. $\frac{1}{100}$th grain of narcotine, when acted upon by a small drop of strong sulphuric acid, dissolves with a yellow solution, if now a small crystal of nitrate of potash be added, the crystal becomes blood red, which after a time dissolves, giving a blood red color to the solution, which after a time changes to orange, If the nitrate of potash be first dissolved in the acid, and then the mixture be allowed to flow upon the narcotine, the deposit immediately becomes blood red, and slowly dissolves, giving a solution of the same color.

2. $\frac{1}{1000}$th, dry; if the mixture of sulphuric acid and nitre be allowed to flow upon the deposit, it immediately becomes blood red, and soon dissolves giving a yellow solution.

3. $\frac{1}{10000}$th, the deposit becomes red, but very soon dissolves with a yellow solution.

4. $\frac{1}{20000}$th, gave no indication.

16. Sulphuric Acid and Bichromate of Potash.

1. $\frac{1}{100}$th, when the dry residue is dissolved by a drop of strong sulphuric acid, it gives a yellow solution, which when treated with a very small crystal of bichromate of potash, changes to a fine wine color, which remains permanent for days; if an excess of the potash salt be used, the mixture passes through several colors and ultimately becomes blue. The permanent color is readily obtained by stirring the potash crystal in the acid solution of the narcotine till it imparts a wine color, and then removing the crystal from the solution.

2. $\frac{1}{1000}$th, if a small crystal of the potash salt be stirred in a drop of sulphuric acid till it imparts a distinct color, and then the mixture be allowed to flow upon the narcotine, the deposit becomes red or brown, and then dissolves with a color dependent upon the amount of potash salt used.

3. $\frac{1}{5000}$th, the deposit gives a brown color.

The change of colors observed in the application of this test might cause the inexperienced to mistake narcotine for strychnia.

Meconic Acid.

When necessary, the meconic acid was dissolved by the aid of a gentle heat.

1. Sesquichloride of Iron.

1. $\frac{1}{100}$th, grain of meconic acid in one grain of water, will give with a solution of sesquichloride of iron, an immediate blood red

solution, the color of which is not affected by several drops of a solution of corrosive sublimate or chloride of gold.

2. $\frac{1}{1000}$th, much the same as 1.

3. $\frac{1}{10000}$th, gives a decided red color to the solution, which when compared with a drop of the reagent is very marked.

4. $\frac{1}{20000}$th, gives a faint red solution, but not satisfactory; if several drops of the meconic acid solution be used, the color is very decided.

If the meconic acid solution be evaporated to dryness and the reagent applied to the residue,—

1. $\frac{1}{10000}$th, the deposit becomes deep blood red.

2. $\frac{1}{40000}$th, the red color is very distinct.

3. $\frac{1}{80000}$th, the color is just perceptible.

It is well known that several other substances beside meconic acid, give much the same reaction with sesquichloride of iron, those most likely to be met with are the sulphocyanides, or acetates, or their acids. The color produced by the sulphocyanides is immediately discharged by a solution of corrosive sublimate, whereas the color developed by meconic acid is unaffected; again, the color produced by acetic acid or acetates, is not discharged by corrosive sublimate, in this respect it agrees with meconic acid, however, the color produced by one drop of $\frac{1}{5000}$th solution of meconic acid, is more intense, than that produced by a drop of concentrated acetic acid: the color of the meconic acid is discharged by a drop of sulphuric acid, with the evolution of much gas, whereas, that produced by acetates is destroyed without the production of gas.

2. Acetate of Lead.

1. $\frac{1}{100}$th, gives with this reagent, an immediate yellow-white amorphous precipitate, which is insoluble in acetic, but readily in nitric acid.

2. $\frac{1}{1000}$th, gives a bluish precipitate.

3. $\frac{1}{20000}$th, in a few seconds a distinct opalescence, which in a little time collects into little flocks.

4. $\frac{1}{50000}$th, in a few minutes a distinct opalescence, which after a time collects into little bluish flocks.

There are many other substances which produce with acetate of lead white precipitates much the same as those produced by meconic acid, of these we may mention: 1. Sulphocyanides; these give a pure white precipitate, soluble in acetic acid, and when from dilute

solutions, readily in nitric acid. 2. Chlorides; a white precipitate, which when from chloride of sodium, will readily dissolve in excess of reagent, acetic, or nitric acid; if the precipitate be due to free chlorine, it will not readily dissolve either in acetic or nitric acid. 3. Sulphuric acid, or sulphates; the precipitate is insoluble in acetic, and sparingly in nitric acid. 4. Soluble carbonates; a white precipitate soluble with effervescence in acetic acid. 5. Phosphates; insoluble in acetic, but soluble in nitric acid. 6. Oxalates; same as phosphates. Of the above substances, it will be observed that the precipitates produced by sulphocyanides, chlorine, and carbonic acid, are soluble in acetic acid; that produced by sulphuric acid, is insoluble in acetic and nitric acid; those from phosphoric, oxalic, and meconic acids are insoluble in acetic, but soluble in nitric acid; chloride of calcium will give a white precipitate with either a phosphate or oxalate, but none with meconic acid.

Another method of distinguishing the meconate from the sulphocyanide of lead, is to add to the precipitate a few pieces of zinc, and then a few drops of sulphuric acid, when the meconate mixture will evolve pure hydrogen, whereas, the sulphocyanide will yield sulphuretted hydrogen.

3. Sulphate of Copper.

1. $\frac{1}{100}$th, gives an immediate copious green precipitate, which is soluble in excess and in acetic acid.

2. $\frac{1}{500}$th, a slight precipitate which increases by standing, collecting in little bluish flocks.

4. Nitrate of Silver.

1. $\frac{1}{100}$th, gives a white amorphous precipitate, readily soluble in ammonia, but insoluble in acetic acid.

2. $\frac{1}{1000}$th, in a few seconds a dirty white precipitate.

3. $\frac{1}{20000}$th, after a little time a slight opalescence, which improves by standing.

5. Chloride of Barium.

1. $\frac{1}{100}$th, after a little time, especially if stirred, a granular and crystalline precipitate, the crystals are of various forms and characteristic, many of them being dumb-bell shaped. In solutions much more dilute than the above the reagent gave no indication.

6. Ferricyanide of Potassium.

1. $\frac{1}{100}$th, after a little time, especially if stirred, green yellow hair-like crystals appear, which after a little while are abundant, these crystals are very characteristic. The ferrocyanide of potassium gives the same form of crystal, but they are much more slow to appear.

2. $\frac{1}{500}$th, no indication after some time.

Meconic acid dissolves in sulphuric acid without change of color, if then a crystal of bichromate of potash be stirred in the mixture it becomes a slight green.

None of the various tests given for narcotine, except those stated, will give a precipitate with meconic acid.

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