

dissolved in water) to exactly neutralize the acid. It is important that there shall be no excess of soda, as the resulting citrate bismuth would be contaminated with the oxide after decomposition.

Put the bismuth solution in a suitable vessel, and add, stirring constantly with a glass rod, sufficient of the solution citrate soda exactly to decompose; the precise quantity is known to have been added, when, after placing the whole upon a cloth filter, the washings after having been suffered to run awhile until clear, first, fail to precipitate bismuth when dropped into water, and second, show no precipitate upon the addition of a few drops of ternitrate bismuth, a small quantity of which should be reserved for this purpose. When the liquid portion has mostly passed, pour water upon the filter until thoroughly washed from nitrate soda, or until the water passes tasteless; then after draining, transfer to bibulous paper, and dry by gentle heat.—*Am. Jour. of Pharm.*

Observations on Ferric Hydrate, the so-called Soluble Peroxide of Iron.

BY PROFESSOR ATTIFIELD, PH.D.

In a memoir, noticed in the 'Chemical News' of June 12, as having been recently presented to the Academy of Sciences, M. Jeannel, in allusion to the fact that ferric hydrate is not always soluble in acids, states that the incomplete solubility is, in his opinion, generally due to the influences of traces of sulphates. He says, according to the Paris correspondent of the 'Chemical News,' "sesquioxide, precipitated from the persulphate, is always to a certain extent insoluble or yields unstable salts; the same is the case with the sesquioxide precipitated from the perchloride, when this has been contaminated by sulphuric acid, or equally when the alkalis employed as precipitants have been so contaminated, or, finally, when the ferric hydrate, precipitated from pure solutions by pure alkalis, has been washed by common water. This explanation does not accord with my experience of the properties of ferric hydrates and oxyhydrates. Firstly, in England the ferric citrates and tartrates used in medicine, are successfully made in large quantities by dissolving ferric hydrate, prepared from ferric sulphate, in solutions of the respective acids and acid-salts. Secondly, I have frequently seen moist ferric hydrate perfectly dissolve in solutions of acids or acid-salts, even though the precipitate has been washed with common water containing sulphate of calcium, a final washing with distilled water having, for various reasons, been neglected. Thirdly, I have often noticed that pure ferric hydrate, soluble when freshly precipitated, becomes imperfectly so if long kept moist or dry. It is true that when alkali is added to solution of ferric sulphate, instead of the latter to the former, an insoluble oxy-sulphate is precipitated, and a similar compound may, possibly, be formed under other circumstances; but ferric hydrate, properly prepared and fairly washed, is readily soluble if only it be used in the moist and recently precipitated condition, with a solution of acid or acid-salt which is not too weak, and the mixture be not boiled or even strongly heated for any considerable length of time. The fact is that ferric hydrate, even though kept under water, decomposes after a time, or more

quickly if heated, losing the elements of water, and become an oxyhydrate, a body insoluble in weak acids, and, also unlike ferric hydrate, incapable of acting as an antidote to arsenic, that is, incapable of forming ferrous arseniate.

It may be useful again to draw attention to the decided alteration in properties which ferric hydrate spontaneously undergoes when exposed beneath the surface of water, or when boiled with water, as evidence that this substance ($\text{Fe}_2\text{O}_3 \cdot 6\text{H}_2\text{O}$) is a true analogue of hydrate of sodium ($\text{Na}_2\text{O} \cdot \text{H}_2\text{O}$), etc., and not a hydrous ferric oxide ($\text{Fe}_2\text{O}_3 \cdot 3\text{H}_2\text{O}$). It is more reasonable to suppose that in acquiring new properties ferric hydrate becomes changed to new compounds then to consider that the changes result from the loss of a portion of water already existing as water. Between ferric hydrate ($\text{Fe}_2\text{O}_3 \cdot 6\text{H}_2\text{O}$) and ferric oxide (Fe_2O_3) there would appear to be several oxyhydrates, analyses, etc., of most of which have already been given in the 'Chemical News' (xvii 56) by Brush and Rodman.

1. $\text{Fe}_2\text{O}_3 \cdot 12\text{H}_2\text{O}$.
2. $\text{Fe}_2\text{O}_3 \cdot 10\text{H}_2\text{O}$.
3. $\text{Fe}_2\text{O}_3 \cdot 8\text{H}_2\text{O}$.
4. $\text{Fe}_2\text{O}_3 \cdot 6\text{H}_2\text{O}$.
5. $\text{Fe}_2\text{O}_3 \cdot 4\text{H}_2\text{O}$.
6. $\text{Fe}_2\text{O}_3 \cdot 2\text{H}_2\text{O}$.
7. Fe_2O_3 .

In the above formulæ, No. 1 represents two molecules of ferric hydrate; Church found a stalactite of true ferric hydrate, native, in Cornwall, and Wittstein gives a similar formula to fresh artificial ferric hydrate. No. 2 is the only oxyhydrate, in this series, still unknown, unless, indeed, Haughton's Kilbride mineral contains this body. No. 3 is brown iron-ore from the Huttenrode Hartz. No. 4 is the formula of a limonite and of artificial ferric hydrate altered by age,—described by Wittstein as having a crystalline structure. No. 5 is the mineral gothite, and also the dried oxyhydrate commonly used in pharmacy. No. 6 is turgite, hydro-hematite, or the mineral from Salisbury, Conn., analysed by Brush and Rodman. No. 7 represents two molecules of ferric oxide.—*Chemical News*.

As stated in the March number of the 'Pharmaceutical Journal,' M. Jeannel prepared a ferric precipitate, which is soluble, not only in solutions of weak acids or acid salts, but even in water. The substance appears to be a mixture of ferric hydrate, or, when dried, oxyhydrate, with a small quantity of ferric oxychloride or oxynitrate. This compound merits further investigation. Hitherto peroxide and perhydrate of iron, pure or impure, have only been dissolved in water under the extraordinary conditions of dialysis. It would be especially interesting to know whether or not M. Jeannel's compounds in the dry, or even in the moist, state is an efficient permanent antidote to arsenic.—*J. A.—In Ph. Journal (Eng.)*

On the Use of the Chloride of Gold in Microscopy.

BY THOMAS DWIGHT, JR., M. D.

Perhaps no re-agent has of late years played so important a part in microscopy as the chloride of gold. By means of it Couheim first demonstrated the terminations of the nerves in the cornea; and since it has been very generally used, particularly in investigations of the nerves. Its application is very

difficult, and it is only after a long series of experiments and failures that proficiency is obtained.

Having had considerable experience with this re-agent in the laboratory of professor Stricker, in Vienna, and having obtained some very satisfactory results, I hope that a few words on its application may not be out of place. The chloride should be dissolved in distilled water, and the solution should never be stronger than the half of one per cent. The object to be examined should be as fresh as possible, and should remain in the fluid for three minutes to perhaps an hour, according to its affinity for the re-agent, during which time it assumes a pale straw color. If the piece be small enough to be readily acted upon, ten or fifteen minutes is almost always sufficient. It is then laid in distilled water, to which just enough acetic acid has been added to give it the faintest possible re-action. In two or three days it will have become purple, verging sometimes on blue, sometimes on red; the latter is the least favourable. The preparation is now enclosed in glycerine, and improves for several days as the color becomes deeper and as the finest fibres are the last to be affected. If the experiment has succeeded, for it sometimes unaccountably fails, the picture presented is one of the most beautiful and instructive that can be imagined. The nerves, muscular fibres and fibrous tissue appear black on the purple background. Epithelial cells are colored, but not so well as by nitrate of silver.

Although the color makes fibres visible which are so fine that they can be seen by no other method, it does not determine their character. To prove beyond all doubt that a minute fibre is a nerve, we must be able to follow it to a large branch. On a very successful preparation of the cornea of a frog, observed nerve fibres of such minuteness that with a magnifying power of nearly two thousand diameters it was impossible to follow them to their terminations. I particularly endeavoured to verify the connection, asserted by Kuhne but not generally accepted, between the nerves and the corneal corpuscles. With every advantage, such a connection is very difficult to prove. I often thought I had found one; but, when examined by a higher power, and placed in different lights, it proved to be only apparent, except in a single instance, and then it was not certain that the fibre in question was a nerve. I mention these facts as proofs of the value of the method, for it is no paradox to say that the better the preparation the more difficult it is to obtain results. As the magnifying power is increased, elements come into view, which, by inferior methods, are never seen and spaces are discovered between bodies supposed to be in connection. The use of the chloride of gold, however, is not yet thoroughly understood, and offers a large field for original investigation.

[The preceding article was written at the suggestion of Prof. Stricker, of Vienna, by whom it has been examined and fully approved.—*Ed.*—*Boston Med. & Surg. Journal*.

—A NEW illuminating material, recently patented in Germany, consists of a mixture of two parts of the poorest rape seed oil, and one part of good petroleum. It is burned in a lamp of peculiar construction, but somewhat similar to that of the ordinary moderator lamp, and gives a light not to be surpassed for purity and brilliancy.