

found in the *Chicago Medical Examiner* for the present month.

The circumstance, then, of its coming before the public, as thus stated, and likely soon to be an article not unfrequently prescribed, makes it appropriate that the nature and properties of the substance should be more generally and fully known, especially as our ordinary text books on chemistry and pharmacy contain very little with regard to it. Although peroxide of hydrogen has not been studied by chemists as fully as many other compounds, yet much is to be met with in chemical journals, especially those of Germany and France, which has not as yet found its way into American scientific literature.

Peroxide of hydrogen binoxide or deuteroxide of hydrogen,  $H_2O_2$ , peroxide and oxygenated water, are synonyms for a compound of two atoms of hydrogen with two of oxygen, or of two parts by weight of the former with thirty-two of the latter, and having the formula,  $H_2 O_2$ ; water being  $H^2 O$ , or the formula  $H O_2$  according to the antiquated dualistic nomenclature. It was discovered in 1818 by Thenard, an eminent French chemist.\* Has never been prepared direct from its elements, nor obtained perfectly pure, but always in an aqueous solution, the most concentrated having a specific gravity of 1.452. According to Schoenbein, it results from various chemical reactions, but soon spontaneously decomposes. It is formed when the peroxides of barium, strontium, calcium, potassium or sodium are decomposed with acids. It forms during the electrolysis of water acidulated with sulphuric acid, also in many instances where slow oxidation is in progress, and under conditions such as give rise at the same time to the formation of ozone, as, for instance, during the oxidation of phosphorus in moist air.

Schoenbein believes, that, in this case, the oxygen of the air is transformed into ozone and antozone, its electrical opposite, and this latter then combines with the water present to form peroxide of hydrogen. In the familiar method of exhibiting the formation of ozone by heating platinum in a vessel of air containing also a small quantity of water and ether, there is formed an appreciable quantity of peroxide of hydrogen along with ozone. Some chemists believe that in all cases where oxidation takes place in moist air, more or less peroxide of hydrogen is formed, as in the rusting of metals, the decay of organic substances, or the respiration of animals,† and that in these processes it plays an important part.

Notwithstanding the many possible methods of forming the peroxide, only those are practically useful, based upon the decomposition of barium peroxide by means of an acid in presence of water.

In the original method of Thenard, hydrochloric acid was employed. But the purification and concentration is, by this method, very difficult and circumstantial. Pelouze employed hydrofluoric acid, also hydrofluosilic acid. But by far the most satisfactory method is that of Balard, as modified by Duprey.‡ A very rapid current of pure carbonic acid is passed through distilled water, and peroxide of barium added in small quantities, care being taken to have the acid always in excess. After filtration, the solu-

tion is concentrated under the receiver of an air-pump. A very dilute solution of the peroxide may also be obtained in the following manner, which, for experimental purpose, is an excellent method, and admits of execution sufficiently rapid to be suited for the lecture table, a small amount of the peroxide of potassium is prepared by melting the metal in a test tube, and passing, for a few minutes, a current of oxygen through the same; the peroxide is then added, in small quantities, to an aqueous solution of tartaric acid, and the filtrate will be found to contain a sufficient quantity of the peroxide of hydrogen for the usual tests.

Peroxide of hydrogen, when in the most concentrated aqueous solution, is a colorless, transparent liquid; it has never yet been frozen, and is less volatile than water. Concentrated solutions are strongly bleaching in their action on coloring matters, have a bitter taste, act on the skin, causing it to become white and give rise to itching sensation. Such solutions rapidly decompose, especially on heating. Dilute solutions will keep for months at ordinary temperatures. The peroxide is slightly soluble in ether, and this solution is the remedy recently brought before the public as "ozonic ether," and is used in similar cases as the aqueous solution, and in doses of from 10 to 30 minims three or four times a day in water.

Peroxide of hydrogen is an active oxidizing body, and doubtless its efficiency in diabetes depends on this circumstance. Dr. Richardson proposes to use it as a substitute for iodine and mercury in constitutional forms of scrofula and syphilis. The strength of the solution is such that the peroxide on decomposition should yield a volume of oxygen ten times as great as the volume of the solvent.

There are numerous good tests for the peroxide. Two of the most delicate are the following.—I. To a freshly prepared starch solution add iodide of potassium, then the peroxide, and finally a solution of sulphate of iron; a blue color at once appears. II. A slightly acid solution of permanganate of potassa is at once decolorized.

This latter may serve as the basis of a quantitative test, by using a solution of the permanganate of known strength, and thus the practical pharmacist has a means at hand of readily testing the relative strength of his solution of the peroxide from week to week, with a view to establishing the proper dose. This, for an aqueous solution of the strength above given, is one to four fluid drachms repeated three times a day.

#### Indelible Ink for marking Linen.\*

BY DR. REIMANN.

The following are a number of formulæ for preparing indelible ink to be made use of in marking linen. As they have been all thoroughly well-tried and found effectual, it is to be hoped they may prove of some use to the public.

The linen is first moistened with a fluid, consisting of a mixture of, 2 parts carbonate of soda in crystals, 2 parts gum arabic, 8 parts of water, and then dried. When quite dry, it is rubbed with a glass cloth to render it as smooth as possible, so that it may be easier to write upon. The composition of

the ink itself is as follows:  $1\frac{1}{2}$  pts. nitrate of silver, 10 pts. distilled water, 2 pts. gum-arabic,  $\frac{1}{2}$  pt. of sap green. The nitrate of silver is first dissolved in the distilled water, and the gum-arabic and sap green are subsequently added.

It is necessary to write with a quill pen, all metallic pens except gold ones, decomposing the ink. It is a good plan to trace the letters with a pencil before writing them.

Marking linen is most conveniently effected by using a pencil and a small copper plate with perforations corresponding to the letters required. This plate is laid upon the linen, and the ink is applied with a pencil to the cut-out spaces, so that these spaces, and these alone are smeared with ink.

The following ink is of service for marking linen with a pencil, when a metallic pattern-tracer is employed. 2 pts. Nitrate of silver, 4 pts. distilled water  $2\frac{1}{2}$  pts. gum-arabic, 3 pts. carbonate of soda crystals, 5 pts. liquid ammonia.

The best way to prepare the ink is first to dissolve the nitrate of silver in the liquid ammonia, and the gum-arabic and soda in the distilled water. The two solutions are then mixed together and slightly warmed, when the whole mixture becomes brown. A few drops of a solution of magenta, makes the ink somewhat more distinct. It is of course unnecessary in this method to previously moisten the spot with gum-arabic solution.

For very fine linen the following ink is best employed: 4 pts. Nitrate of silver, 24 pts. distilled water. To this solution liquid ammonia is added, until the precipitate which is first formed is re-dissolved. Then a little sap green, indigo, etc., are ground together, and dissolved in a solution of 4 pts. gum-arabic, and this solution and that of the nitrate or silver mixed together. The whole is then diluted until it occupies 32 parts. This ink is very limpid and easy to write with.

When dry a hot iron need only be passed over the surface of the linen, when the letters will at once make their appearance, their tint being a deep black. This ink does not injuriously affect even the finest linen.

The discovery of an aniline black has led to the employment of this coloring matter in marking linen.

This ink has the advantage of being cheaper than the ink prepared from nitrate of silver. It has also another advantage over the latter salt, viz., that it is chemically indelible. The ink made with nitrate of silver can be removed by washing the linen with a solution of hyposulphite of soda, or by moistening it with a solution of bichloride of copper and then washing with liquid ammonia. This is not the case with the aniline ink, the color of which cannot be removed by any agent whatever. Linen therefore marked with this ink can never be appropriated by any person but the rightful owner.

Such aniline ink may be prepared in the following way: 8½ grs. of Bichloride of copper are dissolved in 30 grains of distilled water, then are added 10 grains of common salt, and 9½ grains of liquid ammonia. A solution of 30 grains of hydrochlorate of aniline in 20 grains of distilled water is then added to 20 grains of a solution of gum-arabic, containing 2 pts. water, 1 pt. gum-arabic, and lastly 10 grains of glycerin. Four parts of the aniline solution thus prepared are mixed with one part of the copper solution.

\* Annual de Chimie et Phys. [2] vol. viii, p. 200.

† See interesting article on, in Erdman's Journal, vol 89, p. 323.

‡ Compt. Rend I 55, p. 726.

\*From the Scientific American.