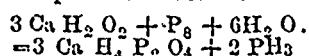


a class, are soluble in water, and some of them in alcohol. They are insoluble in the oils. They are, generally, permanent in air, though several are very deliquescent. When heated to a high temperature they are decomposed, phosphureted hydrogen being emitted and a residue of pyrophosphate remaining. Solutions of the hypophosphites become oxidized by exposure to air, with the production of phosphates. This change takes place much more rapidly under the influence of an elevated temperature, as 212° F.; this fact may be advantageously borne in mind when the evaporation of a solution is to be conducted. Explosions have been known to occur during evaporation, as in the case of Prof. Marquart when evaporating the soda salt, on a sand-bath; Trommsdorff at first ascribed this accident to an excess of heat, but subsequently when operating with a water-bath, and consequently at a heat under boiling, an explosion took place with such violence as to break all the windows in the laboratory, and severely injure the workman who was stirring the granulating salt. Mr. Tuson* in noticing this accident, says that he has superintended the making of large quantities of the soda and lime salts, but never knew anything like an explosion to occur; the heat employed was, however, much below the boiling point of water.

The hypophosphite of calcium is that from which most of the medicinal hypophosphites are prepared, besides being, itself, largely used in medicine. Its formula is $\text{Ca H P}_2 \text{O}_4$. It is seldom found in commerce in a decidedly crystalline form, as the evaporation is generally carried to dryness. It dissolves in 6 parts of cold, and in a rather smaller quantity of hot water. Its preparation, to say the least of it, is exceedingly disagreeable, dangerous and tedious, and in the opinion of the writer, had better be left to the manufacturing chemist, as being altogether unsuited to be carried on in the druggists usual laboratory—the back shop. The process consists in boiling phosphorus in milk of lime until combination is effected. The operation is best conducted in a deep iron pot, set under a hood; 10 parts of phosphorus are added to 300 parts of water, and heat applied until the phosphorus melts; 30 parts of quick-lime are added, and the mixture boiled until phosphureted hydrogen is no longer given off—the original measure of the liquid being kept up by additions of water. The pot should not be more than one-third filled. The liquid is filtered; the residue washed, and the filtrate concentrated to remove carbonate of lime, and finally evaporated, until granulation. The yield is never very constant, being sometimes as low as half the

phosphorus employed. The following equation will explain the reaction:



In reality, however, a large quantity of the phosphorus is lost as phosphate of lime, which is filtered out with the excess of lime. From experiments made by Frederking* the following disposition of the phosphorus was proved: 14½ oz. were operated upon, and the yield of hypophosphite was above the average.

10.5 oz. hypophosphite lime =	3.830 of Phosphorus.
9.35 oz. phosphoric acid =	4.087 "
Phosphureted hydrogen.. =	0.683 "
	14.600 "

The salts of potassium, sodium, and ammonium, are prepared from the lime salt by double decomposition by the respective carbonates, calcium carbonate is precipitated, and the hypophosphite remains in solution, and may be obtained by careful evaporation, at a low temperature. The proper proportions for the decomposition will, of course, be indicated by the combining weights.

The hypophosphites of iron are common ingredients in the various syrups occurring in trade. In two preparations—Pfizer's and the Messrs. Tilden's—the writer found both the ferrous and ferric salts. The ferric salt may be obtained (1) by dissolving ferric hydrate in a cold solution of hypophosphorous acid; (2) or by double decomposition between a solution of sodium hypophosphite and ferric sulphate. The precipitate is in the form of a white powder, which dissolves sparingly in the free acid, but readily in hydrochloric acid.

Hypophosphite of quinia is occasionally prescribed, and it may be well to notice that it may be prepared by dissolving the alkaloid—obtained by precipitation from an acid solution by ammonia—in the hypophosphorous acid; (2) or by double decomposition between sulphate of quinia and barium hypophosphite. The salt of quinia is said to require 60 parts of water for solution—8 grains dissolving in a fluid ounce. A large amount of water would, therefore, be required, or the hypophosphite would fall with the precipitated barium sulphate.

Pharmaceutic Items.

BY C. LEWIS DIERL.

Almost every pharmacist who personally superintends the production of his preparations could, if inclined, to note the difficulties and phenomena occurring during the various processes, materially aid the progress of pharmacy. Unfortunately, many of us, from various causes, are prevented from doing this, and thus a great deal of valuable information is lost to the pharmaceutical world.

Among the observant workers, a large class will be found who from motives of gain are prevented from publishing their observations; others again are prevented by reason of excessive modesty, which causes them to view their experiences as a necessary result of their inexperience; still others, who are not encumbered with a very large excess of modesty in respect to making known their observations, are prevented by press of business or events totally beyond their control; and as I have been rather negligent of late in fulfilling my promise to the editor of the *Pharmacist*, I take the liberty to adopt the latter plea as an excuse for the negligence.

I design in this paper to draw attention to a number of preparations, most of which have come under my observation within the last twelve months. Some of them—officials of the present Pharmacopœia—I have found to admit of improvement, either in their general character or their methods of preparation; while for the unofficals, I have in some cases constructed formulas deemed by me in conformity with the spirit of our national standard.

CITRATE OF IRON.

To prepare this preparation handsomely and properly, it is necessary to employ an excess of hydrated sesquioxide of iron, and if the process is conducted strictly in conformity with the directions of the Pharmacopœia, and the ingredients are in the condition intended, no difficulty exists to prepare a satisfactory article; but a strict adherence to the directions of the formula is necessary to insure uniformly a successful product. One of the principal difficulties practically exists in maintaining the temperature of the mixture of citric acid and hydrated sesquioxide of iron at not exceeding 150° F. I say practically, for in order to do so, constant attention is required, and this during the ordinary shop duties of the pharmacist is, to say the least, annoying, if not impossible. By an elevation of the temperature above 150° F., and probably approaching the boiling point of water, a portion of the hydrated sesquioxide is molecularly changed, and becoming insoluble, renders it exceedingly difficult to determine whether or not the solution has become completely saturated with iron. To overcome this difficulty, I have been in the habit of precipitating about one-eighth more of hydrated sesquioxide of iron than is required by the Pharmacopœia, and adding to about three-fourths of the magma the citric acid prescribed. By occasionally stirring, a clear solution is obtained, which is now gently heated by a warm bath, and fractional portions of the remaining magma added, until it is no longer dissolved—observing, however, to allow each portion to dissolve perfectly before adding the next.

Manipulating in this manner, I have never failed to meet with good results, and until very recently, I had not observed any phenomena worth recording. During the evaporation of a quantity, recently, it was observed that the solution became uncommonly dense before it had been reduced to the proper measure, and that, on diluting a portion with water, a turbid mixture was produced. As all the ingredients had been in proper condition and the manipulation correct, it was inferred that a portion of uncombined hydrated sesquioxide of iron had been dissolved, and this was apparently substantiated by the addition of a relatively small proportion of citric acid, which had the effect of rendering

*Chemical News, No. 31, p. 4

*Archives der Pharmacie, 1859.