ART. XXXVII.—*On the Preparation of Tellurous Acid and Copper Ammonium Tellurite*; by G. O. OBERHELMAN and P. E. BROWNING.

[Contributions from the Kent Chemical Laboratory of Yale Univ.—ccxlix.]

OCCASION having arisen to prepare some tellurous acid from residues from the electrolytic refining of copper,* residues containing a high percentage of tellurous oxide together with small amounts of silica, copper, selenium, and several other impurities, it was determined to try the effect of the solvent action of ammonium hydroxide, followed by the precipitation of the tellurous acid from the ammoniacal solution by acetic acid. This procedure, employed on another occasion for the removal of selenium,† proved satisfactory for the removal of the greater part of the silica, and of those bases which are insoluble in ammonium hydroxide. By dissolving the tellurous acid thus obtained in sodium hydroxide and precipitating the tellurous acid again by acetic acid, copper and many other metals whose hydroxides are insoluble in sodium hydroxide were also removed.

If the precipitation of the tellurous acid by acetic acid is brought about without warming the solution, and the product is dried without heating, the tellurous acid obtained is readily soluble in the alkali hydroxides. If, however, the precipitation takes place in hot solution and the precipitate is dried by application of heat, the product tends to be quite insoluble in the alkali hydroxides.

After the first treatment of the residues with ammonia in this extraction process, it was observed that a purple crystalline salt separated from the alkaline solution on standing. The color suggested a copper compound, and after the removal of this salt by filtration, the filtrate proved to be practically free from copper. It was found that a salt similar in appearance could be produced by allowing an ammoniacal solution of tellurous acid containing some copper salt to evaporate over sulphuric acid, and in the presence of soda-lime. The depth of color varied with the concentration of the copper solution from a reddish purple through pink to nearly white. It was found that a salt which appeared to be identical with the compound just mentioned, could be produced by adding slowly, with constant stirring, acetic acid to an ammoniacal solution of tellurous oxide and copper chloride. The precipitate thus obtained proved to be slightly soluble in water but insoluble in acetic acid and in 50 per cent alcohol. A sample of this compound prepared in the manner

* Furnished through the kindness of the Baltimore Copper Co.

† Browning and Flint, this Journal (4), xxviii, 112, 1909.

just described, which from its intensity of color was considered to contain the maximum amount of copper, gave the following analysis:

TeO ₂	83.84
CuO	4.63
NH ₃	5.22
H ₂ O	6.10
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	99.79

The TeO₂ was determined by the permanganate method. Copper was estimated colorimetrically by comparing in Nessler tubes ammoniacal copper solutions of known strength with weighed amounts of the compound dissolved in acid and made ammoniacal. This method was found to be accurate to 2/10ths of a mg. The ammonia was determined by distillation from an alkaline solution into standard acid. The water could not be determined by difference on ignition, owing to a slight reduction of the tellurium. So the compound was heated at 140°, and the residual ammonia was determined after weighing. From the weights of the total ammonia and of the residual ammonia at 140°, together with the total loss on heating at 140°, the weight of the water was determined. The loss of ammonia which resulted from heating at 140° proved to be about constant and amounted to a third of the total ammonia. The color of the substance changed on heating at 140° from reddish-purple to blue.

It was thought that compounds of a similar nature containing bases other than copper might be formed in a similar manner. Nickel, cobalt, zinc, cadmium, and silver were tried but with no success. Silver gave a yellow precipitate, but this proved to be the ordinary silver tellurite.