acidulated, was now treated with hydrogen sulphide, and the precipitate oxidized with nitric acid, and heated on the sand bath, to vaporize sulphuric acid and dispel organic matter, the residue being weighed as arsenic anhydride (Vaughan's method, *Am. Chemist*, 7, 348, March, 1877).

IX. EXAMINATION OF PICKLES FOR COPPER.

Mr. Edwin Hawley subjected fifteen samples of grocers' pickles to an analysis for copper and other poisonous metals. They were obtained in Michigan, except two samples which were furnished by Chicago dealers. Only one sample was found to contain copper, and this was in an enormous amount. From 5.909 grms of pickle (drained, but not dried), the weight of cuprous sulphide was 0.0755 grm. This gives over four per cent. (4.58 per cent.) of crystallized copper sulphate in the pickle. The pickles of this sample left a decided copper deposit upon a bright knife, upon a few minutes contact. In the examination, the pickle was dried, and ignited in a porcelain crucible, with additions of sulphuric acid. The residue was treated with dilute nitric acid and water, and the resulting solution charged with hydrosulphuric acid gas. Negative results showed absence of lead, etc., as well as copper.

XXXV.—NOTE ON THE DETERMINATION OF ALCOHOL WITH COBALT SULPHOCYANIDE.

BY T. T. MORRELL.

In the *American Chemist*, 6, 370, I published a process for the determination of alcohol, based upon the use of cobalt sulphocyanide. A. Vogel has lately experimented in the same direction, and observes that approximate results may be reached. As I think the principle capable of giving very exact results, I trust that I may be permitted a few words of explanation.

The method as published, directed to place a measured quantity of the dark blue alcoholic solution of sulphocyanide, of standard strength, in the testing tube, and pour the sample to be examined upon it, until just the faintest blue color remained, matching a strip of pale blue glass. This method had the advantage that the temperature was not much altered by the treatment, but had the disadvantage that the red tint of the aqueous sulphocyanide, which decidedly tones the last traces of the blue, was differently diluted in treating samples of different richness. This I overcame, at first, by

using several pale colored solutions by which to measure the final tint, suitably graded in shade, and each representing a range of about 10 per cent. of alcohol. This I could easily do, as the color of the alcoholic sulphocyanide is absolutely unalterable, if the tube be hermetically sealed and kept in the dark.

However, I have lately worked in a different way where great accuracy was required. I put the measured standard blue into a tube 1½ inches in diameter and 10 inches long (with a bottle neck and ground stopper for shaking), and mark the tube about five inches from the bottom, to indicate the amount of liquid to be used in the test. A quantity of the alcoholic liquid to be tested, is now poured upon it, to observe how rapidly the color disappears. If it disappears at once, 95 per cent. of alcohol is run in from a burette until it is restored. This alternate treatment with the sample liquid and the 95 per cent. alcohol, is repeated until the mark on the tube is almost reached. The proper temperature is now obtained, and the few drops required to reach the mark, and correct the depth of tint, are added. If the solution tested is, on the other hand, too strong, distilled water is used instead of the 95 per cent. alcohol. In this way, the final tint is the same in every experiment.

It is always easy to hit the true percentage (ether, amylic alcohol, etc., being absent, to 0.25 per cent., and even much closer results may be got in samples of low percentages, by using a larger amount of the standard blue.

Many substances in solution in the sample, have no effect upon the color, and by this method distillation is often saved. I pointed out in the original paper, how liquors colored with caramel could be treated directly.

I may add that I have successfully titrated minute quantities of silver nitrate in absolute alcohol, with this standard blue, the blue color persisting, of course, when the silver was all thrown down.

The reaction may be also used to determine traces of cobalt in the double cobalt and potash nitrite, since a little free hydrochloric acid does no harm.