A SIMPLE METHOD FOR DETERMINING THE NEUTRALITY OF THE AMMONIUM CITRATE SOLUTION USED IN THE ANALYSIS OF FERTILIZERS.

By N. W. Lord.

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IT is well known that the preparation of a strictly neutral solution of ammonium citrate requires considerable judgment, owing to the uncertainty of the color change when using ordinary indicators in the presence of salts of citric acid.

Even when using corallin, as directed in the official methods of the Association of Official Agricultural Chemists, some uncertainty remains. "Huston's Method" with alcoholic solutions of calcium chloride, while very exact, is a little troublesome.

The following method has been in use in my laboratory for over a year and has proved rapid and exact. I have used it only with litmus as the indicator as the tint so obtained is very easily matched, probably corallin or cochineal would do as well.

The method consists in establishing an accurately neutral color for comparison, by superimposing two tubes, one containing acid litmus, and the other alkaline litmus, and looking through both at once. Then comparing this with the diluted citrate solution, colored to the same depth with the same amount of litmus tincture. The details are as follows:

Add pure litmus solution to about 200 cc. of neutral distilled water until it is colored distinctly, but not deeply. Take half of this and dilute further with its own volume of water. Now take three clear fifty cc. "Nessler tubes," fill two of them with the diluted liquid, and the third to the same depth with the stronger solution. To one of the two first add a drop of dilute sulphuric acid, to the other a drop of ammonia. Set these tubes one in front of the other, so that the light passes through both, thus giving a strictly neutral purple color; a little care will enable one to see them almost like one tube against a sheet of white paper in a ground glass. It makes no difference which tube is in front. Now to the liquid in the third tube containing the stronger solution (which is obviously equal in color depth to the double thickness of the first two tubes), add five cc. of the citrate solution to be tested, and compare the color

produced with the color shown by the doubled tubes. The slightest acidity or alkalinity of the citrate is at once shown by difference of tint; the test is very sensitive. The amount of acid or alkali needed to bring it right, can then be easily obtained by adding one-half normal sulphuric acid or ammonia; then by calculating to the five cc. taken, the necessary addition to the "stock" solution can be found and when made the solution re-tested with remainder of the colored water. The operation is very rapidly performed and the results surprisingly exact. Solutions so neutralized, when tested by Huston's method, have always been found exactly correct. The litmus solution should be prepared from the alcohol extracted litmus, as directed by Sutton.

THE COPPER ASSAY BY THE IODIDE METHOD.

BY ALBERT H. LOW.

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THE last edition of Dr. Peters' Modern Copper Smelting contains a description of the writer's modification of the copper assay by the iodide method. The following description of the same method embodies whatever changes have been deemed desirable up to date as the result of almost daily work upon copper ores and products. For the most accurate technical work I prefer it to all other methods. For practical work it exceeds the electrolytic method in accuracy, notwithstanding that the latter, when every precaution is taken, is perhaps theoretically more accurate.

COPPER ASSAY BY THE IODIDE METHOD.

Prepare a solution of sodium hyposulphite containing about nineteen grams of the pure crystals to the liter. Standardize as follows: Weigh accurately about 0.200 gram of pure copper foil and place in a flask of about 250 cc. capacity. Add five cc. of a mixture of equal volumes of strong nitric acid (1.42 sp. gr.) and water, and thoroughly boil off the red fumes,—a very essential point. Now remove from the lamp and add six to seven grams of crystallized zinc acetate, roughly weighed, and about fifteen cc. of water. Instead of adding the of zinc acetate in this way, a cold saturated solution may be kept on hand and about twenty