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THE USE OF ORTHO-TOLIDINE AS A COLORIMETRIC TEST FOR GOLD.

By W. B. POLLARD.

(Read at the Meeting, February 5, 1919.)

ORTHO-TOLIDINE dissolved in dilute acetic acid was suggested by E. B. Phelps (Bulletin No. 1, Ohio State Board of Health, January, 1913) as a delicate colour test for free chlorine in water. This test was modified by J. W. Ellms and S. J. Hauser (ANALYST, 1914, 39, 454), who showed that a hydrochloric acid solution of ortho-tolidine was better adapted for the purpose. Their reagent was prepared by dissolving 1 gm. of ortho-tolidine in a litre of 10 per cent. hydrochloric acid.

This reagent in its modified form has now been found to be a delicate test for aurichloric acid. A solution of 1 part of gold in a million parts of water gave a bright yellow colour on addition 1 c.c. of the reagent. With a solution containing 1 part of gold in 20 million parts of water the yellow colour can just be detected in a depth of 10 cms. of liquid.

Ellms and Hauser found that in the case of dilute solutions containing free chlorine the colour took about three minutes to fully develop, and was then permanent for about half an hour, after which it slowly faded. This was also found to be the case with aurichloric acid.

In making the test large amounts of strong mineral acid should not be present as the reaction becomes less delicate.

The following metals, when present as chlorides in a dilute hydrochloric acid solution, were found to give no reaction with ortho-tolidine: Al, Sb(1c), Ba, Bi, Cd, Ca, Cr, Co, Cu, Ir, Pb, Mg, Hg, Mn(ous), Ni, Pt, K, Rh, Na, Sr, Sn(1c), U, and Zn.

In a second paper Ellms and Hauser point out that iron in the ferric condition also reacts with ortho-tolidine. The author found that in the case of ruthenium a yellow colour was also formed. Osmic acid gives a yellow colour, but this changes to green on standing. Vanadates acidified with dilute hydrochloric acid give a reaction. Molybdates acidified with hydrochloric acid do not react.

Sodium tungstate acidified with dilute hydrochloric acid gives a precipitate on addition of ortho-tolidine, but no yellow colour develops.

In preparing standard chlorine solutions, Ellms and Hauser found that it was necessary to employ specially purified distilled water. This was not found to be

so necessary in the case of gold solutions. The more dilute gold solutions should, however, only be prepared when required, and should contain a small amount of free hydrochloric acid.

In testing solutions which have been obtained by the use of *aqua regia*, special care should be taken to guard against the possible presence of free chlorine or of nitrous acid. The latter not only reduces gold solutions, but gives a yellow colour with ortho-tolidine. Any reagents used should always be tested for reducing impurities; thus, on one occasion a sample of "pure" ammonium chloride completely reduced a weak gold solution.

In presence of much copper a green colour is obtained instead of a pure yellow; colorimetric comparison can, however, still be made if the standard gold solution is tinted with copper to a similar extent.

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