rapid decay of this activity were also observed. However, larger amounts of water vâpor, of carbon dioxide and of nitrogen affected equally the activity of Hopcalite toward mixtures of hydrogen and air and of carbon monoxide and air, and to about the extent to be expected from the relative adsorbabilities of the three gases.

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NOTE

A New Reagent for Aluminum.—The dye aurin tricarboxylic acid[1] forms with aluminum salts a bright red lake which may be used as a test for aluminum ion. The difficulty with the attractive idea of using the property of lake formation as a test for aluminum has been that other metallic ions, particularly chromium, possess the same property. In this case interference by chromium is prevented by an unusual property of the aluminum lake, which when once formed in an acetic acid acetate buffer is not decomposed in any reasonable time when the solution is made alkaline with ammonium hydroxide, although it does not form in alkaline solution. The chromium lake, which resembles the aluminum compound in appearance, forms in an acetate solution, but is decolorized upon the addition of amonium hydroxide.

The test may be made on a supposed precipitate of aluminum hydroxide as follows. The precipitate is dissolved in 5 cc. of N hydrochloric acid, and 5 cc. of 3 N ammonium acetate and 5 cc. of a 0.1% solution of the ammonium salt of aurin tricarboxylic acid are added. After mixing to allow the lake formation to take place, the solution is made alkaline with ammonium hydroxide containing ammonium carbonate. A bright red precipitate persisting in the alkaline solution indicates the presence of aluminum.

Silicic acid and salts of bismuth, lead, antimony, stannic tin, mercuric mercury and titanium give white precipitates. Salts of cadmium, zinc, nickel, cobalt and manganese give no precipitate. Large amounts of alkaline earths give red precipitates, which are decolorized by carbonate ion. Ferric salts give a deep violet precipitate in the acetic acid solution, which is converted to a reddish-brown by ammonium hydroxide; but the separation of iron from aluminum by sodium hydroxide or peroxide is sufficiently complete and iron should not interfere. It is well to abandon the usual method of using porcelain for alkaline solutions, for while hot strong alkalies may dissolve more total substance from glass than from porcelain, they dissolve less aluminum. Phosphate in large excess prevents

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[1] No. 557, Schultz, "Farbstofftabellen," Berlin, 1923. The dye may be prepared easily by the second method of Ger. pat., 49,970 (1889), Friedländer II, 50. Extraction of the crude dye acid with hot water, solution in an excess of ammonium hydroxide and evaporation to dryness gives an ammonium salt of sufficient purity.

the formation of the lake, but the addition of ammonium hydroxide to a solution containing aluminum and phosphate ions gives a precipitate with a ratio of phosphate to aluminum low enough to make the test satisfactory.

A quantity of aluminum equal to 2×10^{-5} mole gives immediate precipitation; smaller amounts show precipitation or a red solution easily distinguishable from the yellow of the dye in alkaline solution. The delicacy of the test is of the order of 10^{-6} mole of aluminum.

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NITRATION BY MEANS OF A MIXTURE OF NITROSULFONIC AND FUMING NITRIC ACIDS

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A survey of the literature shows the lack of any systematic study of the nitrating action of nitrosulfonic acid. Also the mechanism of its nitrating action is not clear, whether it is direct nitration or whether the nitrosulfonic acid first acts as a dehydrating agent, decomposing into products which then bring about nitration or nitrosation. Moreover, its constitution has not yet been definitely established[1] whether it be $HO.SO_2.ONO$, nitrosylsulfuric acid, or $HO.SO_2.NO_2$, nitrosulfonic acid. Its action on dimethylaniline depends on the temperature, high temperature favoring nitration and low temperature nitrosation.

Girard and Pabst[2] obtained the nitroso derivatives of fluorescein and alizarin by the action of nitrosylsulfuric acid in sulfuric acid solution; from aniline and naphthalene in the presence of acetic acid and hydrochloric acid, respectively, the products were amino-azobenzene and chrysoidine and aniline sulfate. Deninger[3] obtained 3-nitro-4-hydroxybenzoic acid from *p*-hydroxybenzoic acid, and Markownikoff[4] found that nitrosulfonic acid is a stronger nitrating agent for saturated aliphatic hydrocarbons than nitric acid itself. From *p*-hydroxybenzoic acid Biehringer and Borsum[5] obtained besides 3-nitro-4-hydroxybenzoic acid also small amounts of 2,4-dinitrophenol and 3-sulfonic-4-hydroxybenzoic acid

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[1] Biehringer and Borsum, *Ber.*, **49**, 1402 (1916).

[2] Girard and Pabst, *Bull. soc. chim.*, **30**, 532 (1878); *Ber.*, **12**, 365 (1879).

[3] Deninger, *J. prakt. Chem.*, [2] **42**, 552 (1890).

[4] Markownikoff, *Ber.*, **32**, 1441 (1899); **35**, 1584 (1902).

[5] Biehringer and Borsum, *Ber.*, **48**, 1314 (1915).