

acid; fairly soluble in alcohol; slightly soluble in benzene; and insoluble in ether, ligroin or water.

Calc. for $C_{12}H_{10}O_2N_2$: C, 62.59; H, 4.35; N, 12.17. Found: C, 62.00; H, 4.50; N, 12.50.

The hydrolysis of the acrolein derivative in the presence of alkali, as stated in an earlier part, undoubtedly makes possible the condensation between nitromalonic aldehyde and the two methylene groups of the liberated amino ketone. Of course too great a concentration of alkali is likely to decompose this amino ketone so soon as liberated but this does not occur with the concentration of alkali employed by us. The cyclopentadiene thus made possible of formation contains an isonitro group and readily forms salts. The free substance cannot be precipitated from its alkali salts by the addition of carbon dioxide and thus is analogous to the nitro-cyclopentadiene described by Hale.¹

ANN ARBOR, MICH.

[CONTRIBUTION FROM THE DEPARTMENT OF CHEMISTRY OF THE UNIVERSITY OF WISCONSIN.]

NEW ADDITION COMPOUNDS OF QUINOLINE WITH CERTAIN INORGANIC SALTS.

BY JAMES H. WALTON AND CHUAN LING LIANG.

Received April 12, 1919.

The fact that quinoline is an unusually good solvent for a large number of the common substances has not been generally recognized. Not only does it dissolve organic compounds, but a large number of inorganic salts, in particular the acetates, iodides and chlorides of most of the metals, are readily soluble in this substance. Hydrogen peroxide is very soluble in quinoline² and the solution undergoes catalytic decomposition quite similar to aqueous solutions of this substance.³ Quinoline shows a great tendency, moreover, to form addition products with many inorganic substances. This paper describes the preparation of addition compounds of quinoline with certain thiocyanates and acetates.

Experimental.

Reagents.—Synthetic quinoline was used. It was dried over caustic potash and distilled, the portion coming over between 230° and 237° being used in the experiments.

The salts used were the purest obtainable, and were recrystallized whenever possible. Those insoluble in water were prepared from pure materials according to standard methods.

Method of Procedure.—The quinoline was saturated with the particular

¹ *Loc. cit.*

² Walton and Lewis, *THIS JOURNAL*, 38, 633 (1916).

³ Walton and Jones, *Ibid.*, 38, 1956 (1916).

salt at 100°, the clear liquid was then cooled to room temperature, and the crystals that separated were dried. The organic matter in weighed samples of the addition compound was decomposed by successive evaporations with nitric acid, and the residue analyzed by standard methods.

Quinoline Silver Thiocyanate.—This was obtained as small, white crystals. The silver was precipitated as the chloride from the nitric acid solution and weighed in this form.

Calc. for $2C_9H_7N.AgSCN$: Ag, 25.44. Found: 25.46, 25.12.

Quinoline Mercuric Thiocyanate.—Separated as fine, light yellow crystals. Mercury precipitated and weighed as the sulfide.

Calc. for $2C_9H_7N.Hg(CNS)_2$: Hg, 34.81. Found: 34.78, 34.38.

Quinoline Mercurous Thiocyanate.—Compound obtained in the form of small, white, shining crystals. The mercury was precipitated and weighed as the sulfide.

Calc. for $2C_9H_7N.HgSCN$: Hg, 38.82. Found: 38.78, 38.58.

Quinoline Cupric Thiocyanate.—This compound crystallized from the quinoline solution in the form of small, yellow crystals. The copper was determined electrolytically.

Calc. for $3C_9H_7N.2Cu(SCN)_2$: Cu, 17.03. Found: 16.94, 16.87.

Quinoline Cuprous Thiocyanate.—The compound was obtained as beautiful yellow needles. The copper was determined by igniting the salt and weighing as the oxide.

Calc. for $2C_9H_7N.CuSCN$: Cu, 16.73. Found: 16.45, 16.50.

Quinoline Zinc Acetate.—This compound separated from the quinoline solution in the form of a white, crystalline powder. The zinc was weighed as the pyrophosphate.

Calc. for $C_9H_7N.Zn(C_2H_3O_2)_2$: Zn, 20.92. Found: 20.59, 20.76.

Quinoline Cadmium Acetate.—This was also obtained in the form of a white crystalline powder. The cadmium was weighed as the sulfate.

Calc. for $2C_9H_7N.Cd(C_2H_3O_2)_2$: Cd, 23.01. Found: 23.18, 23.12.

The acetates of manganese and cobalt are also readily soluble in quinoline, but under the conditions of the experiment described no addition compounds are formed.

Summary.

The following new addition compounds of quinoline have been prepared: $2C_9H_7N.AgSCN$, $2C_9H_7N.Hg(SCN)_2$, $2C_9H_7N.HgSCN$, $3C_9H_7N.2Cu(SCN)_2$, $2C_9H_7N.CuSCN$, $C_9H_7N.Zn(C_2H_3O_2)_2$, $2C_9H_7N.Cd(C_2H_3O_2)_2$.