ciated, and perhaps also traces of water and of alcohol. The carefully purified samples yielded, after the treatment with nitric acid, clear yellow solutions in which the percentage of mercury was determined by the method of Volhard.[1] In one sample 53.2 per cent., and in another 56.2 per cent. of mercury were found.

The substance does not show a definit melting point. At about 160° it seems to undergo partial decomposition, yielding a yellow liquid. The residual solid turns first yellow and then brown on further heating, but gives no indication of melting at temperatures up to 260°. When applied to the flesh the substance behaved in the same way as the white solid obtained from pure mercury diethyl, producing after several hours a painful and slow-healing burn.

The smallness of the yields of the mercury compound obtained under the conditions of the experiments has made further investigation of its properties in connection with the present research seem inadvizable. During the oxidation of 20 grams of the hydrate, for example, only from 0.1–0.2 gram of the compound was obtained.

Summary.

In the present investigation it has been shown that:

(1) Hydrazine hydrate in ethyl alcohol is oxidized by yellow mercuric oxide substantially in accordance with the equation

$$N_2H_4.H_2O + 2HgO = N_2 + 3H_2O + 2Hg.$$

(2) There is usually an appreciable deficit in the percentage of nitrogen evolved, however, which is not as a rule to be explained by the formation of ammonia, or of hydronitric acid, but seems to be attributable, in part at least, to the formation of ethylidene azine.

(3) Qualitative tests indicate the formation of mercury diethyl as a by-product of the reaction, together with a white, solid compound containing carbon, hydrogen, and about 55 per cent. of mercury.

This investigation was undertaken at the suggestion of Professor A. W. Browne, and was carried out under his direction.

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ISOMERIC INORGANIC COMPOUNDS.

BY ADOLPH LAW VOGE.

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Recently it has fallen to my lot to compile an index alphabetically according to condensed formulas of 15,000 inorganic compounds. In doing this many isomerisms and polymerisms were brought to light. I have thought that the new instances might be worth a note in the Journal. They are as follows:

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[1] Treadwell-Hall, ' Analytical Chemistry," Vol. II, first edition, p. 134.

1. $Tl_2SO_4.Tl_2(SO_4)_3$.
Lepsius, *Central-Blatt*, 1891, I, 694.
$Tl_2S_2O_8$.
Foster and Smith, THIS JOURNAL, 21, 934.

2. $Hg(NO)_2$, mercuric hyponitrite.
Divers, *Proc. Chem. Soc.*, 1898–9, 199.
$HgN.NO_2$, mercury nitramide.
Thiele and Lachmann, *Ann.*, 288, 297 (1895).

3. $N(SO_3H)_2(OSO_3H)$, trisulfo-oxyazoic acid.
Fremy, *Ann. Chem. Pharm.*, [3] 15, 408.
Claus, *Ann.*, 158, 52 (1871).
Raschig, *Ann.*, 241, 230 (1887).
$NH_2OH(SO_3)_3$, hydroxylaminetrisulfonic acid.
Haga, *J. Chem. Soc.*, 1896, 1654.
Divers, *J. Chem. Soc.*, 1904, 108.
$N_2H_4.H_2S_2O_6$, hydrazine bisdithionate.
Curtius, *J. prakt. Chem.*, [2] 39, 27 (1889); 42, 521 (1890); 50, 311.
$SO_2OH(NH_2)$, amidosulfonic acid.
Raschig, *Ann.*, 241, 161 (1887).
Divers and Haga, *J. Chem. Soc.*, 77, 978 (1900).

5. $Pt(NO_2)_2.2NH_3$.
Lang, *J. prakt. Chem.*, [1] 83, 415 (1861).
Cleve, *Nova Acta Upsala*, [3] 6, 5 (1866).
$(Pt(NH_3)_4)Pt(NO_2)_4$.
Magnus, Moissan, T. 5, 831.

6. $N_2H_4.H_3PO_3$, hydrazine phosphite.
Sabanayev, *J. Russ. Phys.-Chem. Soc.*, 30, 403, 415 (1899).
$P(NH_2)_2(OH)_3$, diamidophosphoric acid.
Stokes, *Am. Chem. J.*, 16, 140.
$OP(NH_2)(ONH_4)(OH)$, ammonium monoamidophosphate.
Stokes, *Am. Chem. J.*, 15, 205.
Sabanayev, *Z. anorg. Chem.*, 17, 486.

. $NH_2OH.H_3PO_3$, monohydroxylamine phosphite.
Sabanayev, *J. Russ. Phys.-Chem. Soc.*, 31, 375 (1899).
$NH_4H_2PO_4$, dihydroammonium phosphate.
Krickmeyer, *Z. physik. Chem.*, 21, 53.

8. $HPO_2(NH_2)_2$, diamidophosphoric acid.
Stokes, *Am. Chem. J.*, 15, 198 (1893).
$P_2O_3(ONH_4)(NH_2)_3$.
Gladstone and Holmes, *J. Chem. Soc.*, [2] 7, 15.

. NH_4PO_3, ammonium metaphosphate.
Fleitmann, *Pogg. Ann.*, 78, 233.
$H_2PO_3(NH_2)$, amidophosphoric acid.
Stokes, *Am. Chem. J.*, 15, 198.
$N_2H_4.2H_2PO_3$, hydrazine bissubphosphate.

0. NH_2I, iodoammonia.
Bineau, *Ann. chim. phys.*, 67, 228.
$N_2H_4.2HI$, diammonium diiodide, hydrazine diiodide.
Rothenburg, *Ber.*, 26, 865.

11. $Cr_2(SO_4)_3.H_2SO_4$, chromosulfuric acid.
Recoura, *Compt. rend.*, 114, 477.
$(SO_3)_4Cr_2O_2(OH)_2$ or $Cr_2(SO_4)_4H_2$.
Recoura, *Compt. rend.*, 117, 37.
Wyrouboff, *Bull. soc. chim.*, [3] 27, 677.

12. $(Co(NH_3)_5(SO_3))NO_3$, sulfitocobalt pentammine nitrate.
Werner, *Z. anorg. Chem.*, 16, 410.
$(Co(NH_3)_5(NO_2))SO_4$, nitritocobalt pentammine sulfate.
Gibbs, *Proc. Am. Acad.*, 10, 5 (1875).

13. NH_4ClO, ammonium hypochlorite.
Soubeiran, *Ann. chim. phys.*, 48, 141.
Cross and Bevan, *Ber.*, 24, 689.
$NH_2OH.HCl$, hydroxylamine hydrochloride.
Lang, *Centralbl. Suppl.*, 5, 226.

14. $(Ir(NH_3)_6)IrCl_6$.
Moissan, T. 5, p. 911.
$(Cl_3Ir(NH_3)_3$, trichloro iridium triammine.
Werner and de Vries, *Ann.*, 364, 77.

15. $Co_2(O_2)(NH)(NH_3)_6Cl_3.HCl$.
Werner, *Z. anorg. Chem.*, 21, 111.
$(Cl(NH_3)_3Co(NH_2)(O_2)Co(NH_3)_3Cl)Cl_2$.
Werner, *Ann.*, 375, 7.

16. $(Br_2Pt(NH_3)_2)$, dibromo-platinum diammine.
Peyrone, *Ann.*, 51, 1.
Odling, *Ber.*, 3, 682 (1870).
$(Pt(NH_3)_4)PtBr_4$.
Moissan, T. 5, p. 830.

17. NH_4BrO, ammonium hypobromite.
Maumené, *Compt. rend.*, 70, 147.
$NH_2OH.HBr$, hydroxylamine hydrobromide.
Adams, *Am. Chem. J.*, 28, 198.

18. $HgBr_2.2NH_3$, mercury dibromide diammine.
Naumann, *Ber.*, 42, 3789.
$NHg_2Br.3NH_4Br$.
Gaudechon, *Compt. rend.*, 148, 1763.

19. NH_2HgBr.
Loewig,
Mitscherlich, *J. prakt. Chem.*, 19, 455.
$NHg_2Br.NH_4Br$, dimercurammonium bromide.
Mitscherlich, *Ibid.*

20. $NH_4BaN(SO_3)_2$.
Divers and Haga, *J. Chem. Soc.*, 61, 966.
$Ba(SO_3NH_2)_2$, barium amidosulfate.
Berglund, *Ber.*, 9 (1896).
Lindbom, *Bull. soc. chim.*, [2] 29, 425.

21. $Cu_4As_2O_7$, cupropyroarsenate.
Reichard, *Ber.*, 31, 2166.
$2Cu_2O.As_2O_5$.
Hampe, *Z. Berg-Hütten Salinenwesen*, 22, 102 (1874).

22. $N_2H_4.H_2C_2O_4$, acidic hydrazine oxalate.
Sabanayev, *J. Russ. Phys.-Chem. Ges.*, **31**, 378
(Isomeric with $NH_2.CO.COOH.NH_3O$.)
$HCO_2(NH_2)$, carbamic acid (hypothetic?)
Salts of which prepared by:
Basarow, *J. prakt. Chem.*, [2] **1**, 283.
Mente, *Ann.*, **248**, 234 (1888).
Naumann, *Ibid.*, 150, 1 (1869).

As the properties of the compounds described were different for each pair, it seems probable that we are not dealing with the same compound under varying names and symbols.

POTASSIUM: ITS QUALITATIVE DETECTION AS THE COBALTINITRITE.

BY LEON T. BOWSER.

Received July 25, 1911.

In a previous note[1] a rapid method was outlined for the detection of potassium, even in very small amounts, by precipitating it as dipotassium sodium cobaltinitrite, $K_2NaCo(NO_2)_6$, in the presence of ethyl alcohol. A subsequent study of its possibilities resulted in such improvement as to render it far superior to any of the commonly applied tests, and from it has been evolved a very satisfactory method for the estimation of minute amounts of potassium. The present paper will deal only with the qualitative test, however, leaving the estimation to be dealt with in a later paper.

Many qualitative tests for potassium are known but practically every one has serious shortcomings. There are almost no potassium salts even fairly insoluble in water, hence most of the tests are applicable only to very concentrated solutions. Among the reactions applied are the following: Chloroplatinic acid, H_2PtCl_6, gives with neutral or acid solutions of potassium salts, in the presence of hydrochloric acid, a yellow, crystallin precipitate of potassium chloroplatinate, K_2PtCl_6. This precipitate is soluble in about 19 parts of water at 100° C. or in 111 parts at 10°, and comparatively recent work[2] has shown its solubility in absolute ethyl alcohol at 20° to be 0.0007 gram in 100 cc. of solution. The presence of alcohol is necessary in the use of this test unless concentrated solutions be employed. The reagent also gives a precipitate with certain non-alkali bases, which must be removed previous to testing for potassium, hence this reaction is but little used for qualitative work. Sodium perchlorate, $NaClO_4$, precipitates potassium perchlorate, $KClO_4$, from solutions of potassium salts, the precipitate being slightly soluble in water but almost insoluble in strong alcohol. Potassium may also be

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[1] THIS JOURNAL, **32**, 78 (1910).

[2] *Ibid.*, **30**, 747 (1908).