bility measurements, that if compounds of iodine and a bromide exist at all in aqueous solution, they are present in very minute quantities.

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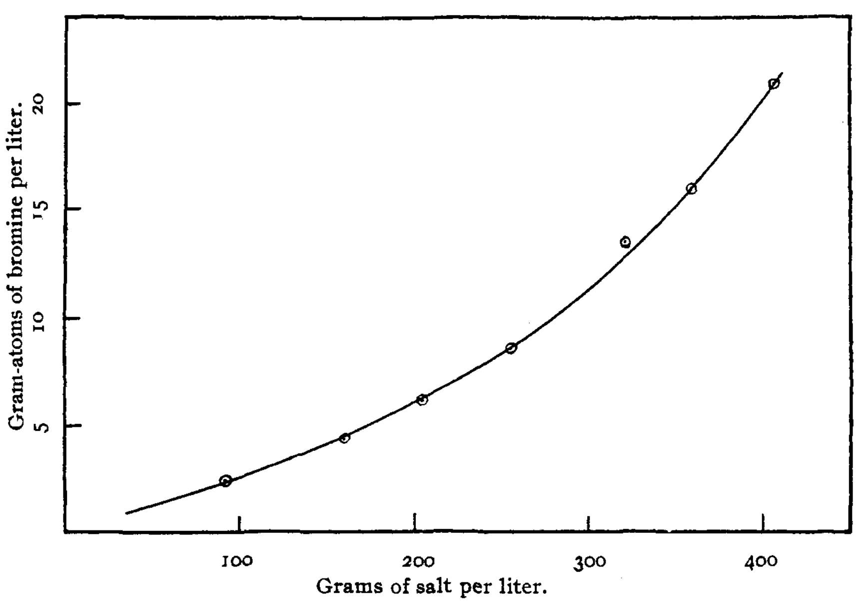
THE SOLUBILITY OF BROMINE IN AQUEOUS SOLUTIONS OF SODIUM BROMIDE.

BY JAMES M. BELL AND MELVILLE L. BUCKLEY.

Received October 26, 1911.

Reference was made in the preceding paper to the results of Worley on the solubility of bromine in solutions of potassium bromide and of Joseph and Jinendradasa on the color changes in bromine solutions due to the addition of bromides. The following table and figure give the results of solubility determinations of bromine in solutions of sodium bromide at 25°. The free bromine was estimated by adding a known volume of the solution to an excess of an iodide solution. The iodine liberated was

NaBr per liter. Grams.	Bromine per liter. Gram-atoms.	Density.
92.6	2.479	1.213
160.5	4.345	1.372
205.8	6.195	1.515
255.8	8.575	1.678
319.7	13.65	1.997
359.0	16.04	2.137
...	19.23	2.327
408.3	20.85	2.420



determined by titration against a known thiosulfate solution. The bromide in solution was determined by evaporating 10 cc. of the solution and weighing the residue.

The concentrations vary over almost the whole range up to saturation, and although the results of Worley for potassium bromide have not such a wide range, yet the two curves are similar. In dilute solutions the ratio of bromine to bromide is about 1 mole Br_2 to 1 mole NaBr but for more concentrated solutions the ratio becomes greater. For solutions of sodium bromide near saturation the ratio is about 2.5 moles bromine to 1 mole salt. For iodine[1] the ratio becomes smaller, as the concentration increases; in other words, the solubility curves for bromine and iodine in bromide solutions have opposite curvatures.

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ACTION OF AMMONIA UPON AMMONIUM THIOCYANATE.[2]

BY W. P. BRADLEY AND W. B. ALEXANDER.

Received November 3, 1911.

Deliquescence.—The number of substances which deliquesce in dry ammonia gas is very limited. Those which deliquesce in ammonia at ordinary temperature and at a pressure of approximately one atmosphere are the following:

Salts: NH_4SCN, ammonium thiocyanate,[3] NH_4NO_3, ammonium nitrate,[4] $Hg(CN)_2$, mercuric cyanide,[5] $Ag_2Pt(SCN)_6$, silver platini-thiocyanate.[6]

Non-metallic compounds: ICN, cyanogen iodide,[7] BrCN, cyanogen bromide,[8] $SO_2(NH_2)_2$, sulfamide,[9] BI_3, boron iodide,[10] AsI_3, arsenious iodide.[11]

Elements: Lithium,[12] potassium,[13] caesium,[14] strontium,[14] iodine.[15]

[1] See preceding paper.

[2] Read before the Conn. Valley Section, Am. Chem. Society, Oct. 7, 1911.

[3] We have been unable to find any mention of this case of ammonia deliquescence in the chemical literature. The fact is known, however, in some quarters at least, among those interested in ammonia refrigeration.

[4] Divers, *Chemical News*, 27, 37 (1873); *Z. physik. Chem.*, 26, 430 (1898). Raoult, *Compt. rend.*, 76, 1261–2 (1873). Franklin and Kraus, THIS JOURNAL, 27, 213 (1905).

[5] Franklin and Kraus, *Am. Chem. J.*, 23, 300 (1900).

[6] Peters, *Ber.*, 41, 3185 (1908).

[7] Bineau, *Ann. chim. phys.*, 67, 234 (1838).

[8] Bineau, *Ibid.*, 70, 257–61 (1839).

[9] Franklin and Stafford, *Am. Chem. J.*, 28, 95 (1902).

[10] Besson, *Compt. rend.*, 114, 542–4 (1892).

[11] Besson, *Ibid.*, 110, 1258–61 (1890).

[12] Moissan, *Ibid.*, 127, 687 (1898); *Bull. soc. chim.*, [3] 21, 906 (1899). Ruff and Geisel, *Ber.*, 39, 828–843 (1906). Kraus, THIS JOURNAL, 30, 657 (1908).

[13] Ruff and Geisel, *loc. cit.* Moissan, *loc. cit.*

[14] Ruff and Geisel, *loc. cit.*

[15] Hugot, *Compt. rend.*, 130, 505 (1900). Colin, *Ann. chim. phys.*, 91, 263 (1814).