127. *Solubility of Barium Nitrate in Water.*

By J. NEWTON FRIEND and W. N. WHEAT.

No systematic study of the solubilities of $Ba(NO_3)_2$ in H_2O at various temps. appears to have been made since the work of Étard (*Ann. Chim. Phys.*, 1894, 2, 527), although numerous isolated data mostly at room temp. have been recorded by different investigators. As Étard's data for various salts have in general proved too low (Friend, J., 1929, 2782), it was decided to study the solubility of $Ba(NO_3)_2$ between 0° and 100° and to ascertain the conditions for the existence of Hirzel's supposed dihydrate (*Z. Pharm.*, 1854, 49). The salt was prepared by dissolving the pure carbonate in dilute nitric acid and twice crystallising it. The results are given in the table, where *S* represents the solubility as g. of anhyd. $Ba(NO_3)_2$ per 100 g. of solution. The solubility curve appears to be continuous and no evidence was obtained of the dihydrate. As the pptn. of Ba as $BaSO_4$ is tedious, it was decided to ascertain if the $Ba(NO_3)_2$ in solution could be estimated by evaporation in a Pt dish on the water-bath and removal of adsorbed H_2O by heating in an electric oven. Even when the final drying was effected at 250° the results were slightly higher than those obtained by pptn., as the following data show :

$Ba(NO_3)_2$, g., by	(1) Evaporation	1·8158	0·5866	0·5164
	(2) Pptn. as $BaSO_4$	1·8134	0·5857	0·5147

The differences, possibly due to slight loss of pptd. $BaSO_4$, are too small appreciably to affect the solubility determinations; all the present authors' data in the table, save those at 9·1°, 9·6°, and 34·2°, were obtained by pptn. Étard's results are not included in the table as they were in most cases too low. The other data agree very closely in general. Within the limits of exptl. error they are represented by the equation $S = 4{\cdot}70 + 0{\cdot}173t + 0{\cdot}00045t^2$.

Solid phase, $Ba(NO_3)_2$.

Temp.	Ref.	*S.*	Temp.	Ref.	*S.*	Temp.	Ref.	*S.*
0°	C.	4·74	15·0°	E.	7·30	30·0°	C.	10·33
0·2		4·64	15·6		7·51	34·2		11·21
6·2		5·69	17·0	E.	7·68	35·0	F.	11·39
7·0		5·73	20·8		8·39	45·2		13·56
9·1		6·22	21·1	F.	8·46	50·0	G.	14·63
9·1	F.	6·25	25·0	P.	9·54	58·6		16·59
9·6		6·25	25·0	D.	9·55	79·4		21·29
9·6		6·23	25·0	G.	9·28	83·0		22·12
12·0		6·63	25·0	R.	9·29	86·5		23·10
13·6		7·02	30·0	M.	10·25	89·6		23·51
15·0	Ch.	7·56	30·0	B.	10·40	95·0		24·80

C. = Coppadoro, *Rend. Soc. chim. ital.*, 1911, (2), 3*a*, 207; *Gazzetta*, 1913, **43**, (i), 138; F. = Findlay, Morgan, and Morris, J., 1914, **105**, 779; Ch. = Chlopin, *Z. anorg. Chem.*, 1925, **143**, 112 (this datum is calculated by using Euler's density, *viz.*, 1·062, for the saturated solution at 15°); E. = Euler, *Z. physikal. Chem.*, 1904, **49**, 315; P. = Parsons and Corson, *J. Amer. Chem. Soc.*, 1910, **32**, 1383; D. = D'Ans and Siegler, *Z. physikal. Chem.*, 1913, **82**, 35; G. = Glasstone and Riggs, J., 1925, **127**, 2846; R. = Rothmund and Wilsmore, *Z. physikal. Chem.*, 1902, **40**, 620; M. = Masson, J., 1911, **99**, 1132; B. = de Baat, *Chem. Weekblad*, 1918, **15**, 463.

THE TECHNICAL COLLEGE, BIRMINGHAM.

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