based on direct experiment is drawn full, while the extrapolated portions are represented by broken lines. Comment is unnecessary.

Summary.

In preceding measurements of the equilibrium pressure of the reaction $CaCO_3 \rightleftarrows CaO + CO_2$, the errors have been due mainly to a lack of definiteness in the temperature of the reacting system; in the author's experiments this difficulty has been obviated by the use of a very small quantity (0.1 gram) of material, by which means the extreme temperature variation throughout the charge did not exceed 2°. This necessitated the use of a form of apparatus in which the vapor space was always small; this, and the mode of measuring the temperature accurately, are described in the paper. It is considered that the uncertainty in the temperature is not greater than ±2°.

The results of four separate series of measurements can be well reproduced by the equation

$$\log p = \frac{-9340}{T} + 1.1 \log T - 0.0012\, T + 8.882$$

where p is the equilibrium pressure (expressed in millimeters of mercury) at the absolute temperature T. The pressure reaches one atmosphere at 898° C. Two of the numerical coefficients of the above equation are derived from the heat of reaction and the heat capacities of the components; the form of the equation is consistent with our present theoretical knowledge; consequently, in spite of the somewhat unsatisfactory character of the thermal data, the equation may be used with some confidence for extrapolation. The above equation represents the experimental results much better than the formula proposed by Riesenfeld, and derived from the approximation formula of Nernst; values extrapolated by means of the latter diverge from, and are inherently less probable than, those derived from the former, especially at temperatures above 1000°.

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ON THE CONDUCTIVITY OF SOME CONCENTRATED AQUEOUS SOLUTIONS AT ZERO.

BY W. H. SLOAN.

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As a preliminary step to an investigation of the conductivities of certain salts in mixed solutions of water and ammonia, some measurements were made of the conductivity of potassium iodide in concentrated aqueous solutions, which gave unexpected values. Further investigation confirmed these results, and the measurements were extended to potassium bromide, sodium nitrate, ammonium nitrate, silver nitrate, and copper

Potassium iodide.

Log. $\phi/1000$.	$\phi/1000$.	Λ.	Log. $\phi/1000$.	$\phi/1000$.	Λ.
9.2470	0.1766	57.45 57.15	0.4242	2.651	70.96 70.70
9.2659	0.1845	59.17	0.5211	3.32	71.56
9.3170	0.2075	64.33	0.6180	4.150	72.03
9.3570	0.2371	65.20	0.7252	5.31	72.36
9.4419	0.2760	67.83	0.8928	7.812	73.13
9.4420	0.2767	67.60 67.70	1.0262	10.62	74.13
			1.1232	13.28	74.55
			1.3273	21.25	75.60
9.5211	0.3320	69.43 69.20			
9.6180	0.4150	70.56 70.50 70.25			
9.7430	0.5534	71.00 70.65 70.77			
9.8222	0.664	70.43			
9.9191	0.830	70.70 70.53			
0.1232	1.328	70.46			
0.2201	1.660	70.60 70.70			

Potassium bromide.

9.4523	0.283	65.7
9.5704	0.3717	67.30
9.8714	0.7435	68.63
0.1724	1.487	69.35
0.4734	2.975	70.10
0.7745	5.95	72.50
1.0755	11.90	74.65

Ammonium nitrate.

9.0706	0.1177	31.22
9.3011	0.200	45.01
9.6021	0.400	54.05
9.9031	0.800	58.36
0.2042	1.600	61.20
0.5052	3.200	64.41
0.8062	6.400	66.87
1.1072	12.800	69.72
1.4085	25.61	71.45

Silver nitrate.

9.3273	0.2125	25.70
9.4242	0.266	28.76
9.7253	0.531	37.22
0.0263	1.067	44.46
0.3273	2.125	50.56
0.6283	4.250	55.40
0.9294	8.500	59.75
1.2304	17.00	63.10

Sodium nitrate.

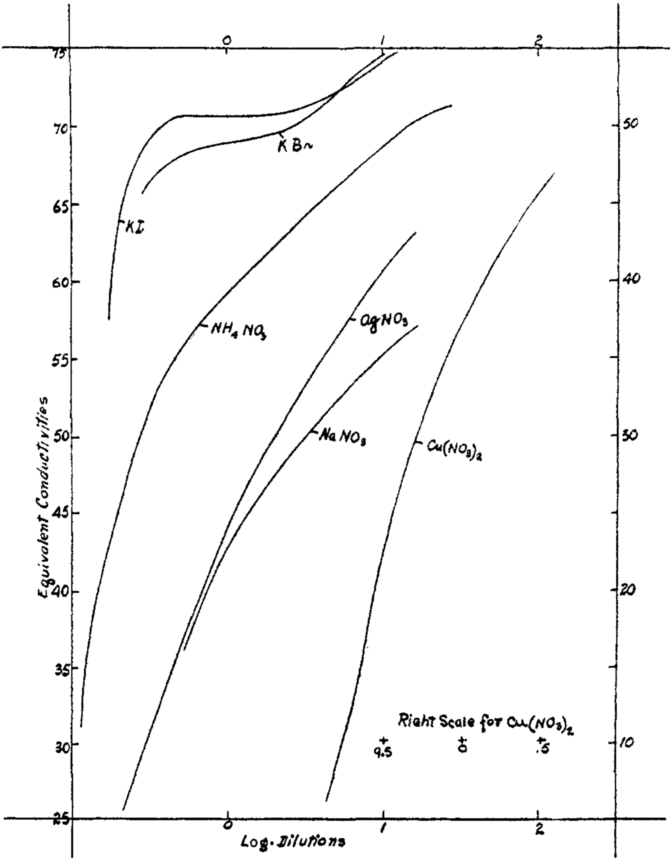
9.7253	0.531	36.41
0.0263	1.0625	43.20
0.3273	2.125	47.81
0.6284	4.250	51.50
0.9294	8.50	54.72
1.2304	17.00	57.41
..	...	...
..	...	...

Copper nitrate.

Log. $\phi/100$.	$\phi/1000$.	Λ.	K (spec. cond.)
9.1143	0.130	5.65	44.58
9.1600	0.144	7.42	51.36
9.2692	0.186	12.26	66.01
9.4153	0.2602	18.98	72.96
9.7165	0.5206	30.33	58.28
0.0175	1.041	37.90	36.41
0.3190	2.084	43.20	20.73
0.6207	11.32	47.00	11.32

nitrate. Of these, the potassium bromide resembles the potassium iodide to some extent, but its limited solubility prevented measurements of any concentrated solutions. The other salts gave no exceptional values, save in the case of copper nitrate, where in the concentrated solutions, the specific conductivity of the solution increased from a dilution of 0.13 up to 0.26 and then fell off again. (See table Copper nitrate).

The measurements were made by means of a wire bridge and a Kohlrausch conductivity cell. A large Dewar tube was used for a thermostat, which was filled with crushed ice and water. With the use of a stirrer, a very constant temperature of 0.05° to 0.1° + was easily maintained.



(This type of thermostat was first used on account of the special type of cell necessary in the conductivity measurements of the ammonia solutions. The use of the Dewar tube made the reading of the volumes possible from the outside).

The water used was twice distilled, first from dilute sulphuric acid and potassium dichromate, and then from a barium hydroxide solution. The salts used were of Baker's Special Analyzed Chemicals, and in the case of the potassium iodide, the measurements were checked against a recrystallized sample. In every case several readings were taken on the bridge, and in the case of the potassium iodide, four different samples of salt, and three different cells were used, all giving check results.

The above results were obtained where Λ = equivalent conductivity and $\phi/_{1000}$ = dilution.

In plotting the curves, the logarithms of the dilutions were used.

The results obtained for the concentrated solutions of potassium iodide are decidedly different from those given by Jones and Douglas,[1] but the type of curve agrees very closely with that of Kahlenberg,[2] the molecular conductivity being a little higher than Kahlenburg's.

In plotting the conductivities of potassium iodide and potassium bromide at 18°, on the same basis, the values as given by Kohlrausch and associates, show the same tendency, but not so marked, but the concentrations are not so great.

The values at 0° for potassium iodide resemble in some respects, the conductivities of certain salts in methylamine and liquid ammonia, as given by Franklin and Gibbs[3] and Franklin.[4]

A satisfactory explanation of the results obtained does not seem possible at present. It is hoped that further measurements may produce some clue.

This work was carried out at the suggestion and under the direction of Prof. E. C. Franklin.

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[FROM THE INSTITUTE OF ANIMAL NUTRITION LABORATORY, STATE COLLEGE, PA.]

ELECTRIC COMBUSTION FURNACE FOR METHANE DETERMINATION.

BY J. A. FRIES.

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In connection with the respiration calorimeter experiments upon cattle which are being carried on here, it is necessary to determine the amounts of combustible gases (consisting chiefly or wholly of methane) excreted. For this purpose an electric combustion furnace has been in use in this laboratory during several periods of 50 consecutive hours each, and is giving perfect satisfaction.

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[1] *Am. Chem. J.*, 26, 445. Calculated to reciprocal ohms, Tower's "Conductivity of Liquids."

[2] *J. Phys. Chem.*, 5, 348.

[3] THIS JOURNAL, 29, 1389.

[4] *Z. physik. Chem.*, 69, 272.