[CONTRIBUTION FROM THE CHEMISTRY DEPARTMENT OF STANFORD UNIVERSITY]

The Equivalent Conductance of Aqueous Barium Hydroxide Solutions

BY H. GENEVA LEOPOLD AND J. MURRAY LUCK

Available data on the conductance of barium hydroxide solutions are rather limited. Those given in the "International Critical Tables"[1] apply to quite dilute solutions and include only three values which fall within the concentration range 0.016 to 0.20 *M*. The only other data found in the literature, but not used in deriving the values in the "International Critical Tables," are those of the Bureau of Standards, at temperatures between 23 and 27°.[2] However, when these two sets of values were compared, a large discrepancy was found. This observation led us to undertake the present measurements, required for biological experiments at 28°.[3]

TABLE I

Concentration, milli-equivalents per liter solution, c	Specific conductance, $k \times 10^4$	Equivalent conductance, $(k \times 10^6)/c$	Concentration, milli-equivalents per liter solution c	Specific conductance, $k \times 10^4$	Equivalent conductance, $(k \times 10^6)/c$
427.8	794.6	185.7	76.0[b]	165.4	217.7
381.7	718.2	188.1	75.0[b]	163.1	217.3
297.9	578.6	194.2	74.7[b]	163.1	218.3
232.7	462.9	198.9	72.5[b]	159.0	219.4
182.2	371.9	204.1	72.4[b]	158.1	218.5
143.9	299.4	208.1	70.7	155.7	220.1
123.1	258.2	209.7	70[a]	154.6	221.2
109.1	230.4	210.7	69.9[b]	153.6	219.7
100[a]	214.8	215.4	67.9[b]	149.8	225.5
96.7	207.6	214.6	66.5	146.4	220.1
85.7	184.4	215.3	53.3	119.3	223.8
85.2[b]	184.3	216.4	50[a]	113.1	226.2
81.9[b]	177.1	216.1	47.3	106.5	225.4
80.9[b]	175.7	217.3	42.6	95.3	223.8
78.5[b]	171.0	217.7	32.9	75.5	229.3
76.1[b]	165.8	217.9			

[a] Data from "International Critical Tables."

[b] Data from the Bureau of Standards Paper 141.

Materials and Procedure.—The solutions were prepared from Baker's Analyzed barium hydroxide crystals by dissolving in boiled out distilled water. The concentrations were determined by titration against tenth normal hydrochloric acid, based upon dried potassium acid phthalate, using methyl orange as indicator. The resistance measurements were

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(1) "International Critical Tables," Vol. 6, p. 246.

(2) Cain and Maxwell, Technologic Papers of the Bureau of Standards, No. 141 (1919).

(3) Subsequently it was learned by communicating with the Bureau of Standards in regard to the discrepancy that the value of the cell constant actually used in their calculations was the reciprocal of that defined in their paper. When the data were recalculated, they were in agreement with those of the "International Critical Tables" and with the present results.

made in a thermostat at 28 (corr.) ± 0.01°. The three or more readings for the same concentration checked to within ±0.03 ohm. The cell constant, 0.762, was determined at 25° by potassium chloride solution containing 7.4931 g. per 1000 g. of water, using the Kohlrausch standard value.[4]

Results.—The experimental values are given in Table I. When the three values from the "International Critical Tables" which fall within our concentration range are plotted and the equivalent conductance at 28° obtained by interpolation, they agree with the data reported in this paper.

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Summary

Measurements were made of the conductivity at 28° of a series of aqueous barium hydroxide solutions varying in concentration from 0.016 mole per liter to 0.20 mole per liter.

[4] "International Critical Tables," Vol. 6, p. 230.

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The Adsorbent Properties and the Specific Surface of Lead Sulfate

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The method of determining the specific surface of a lead salt in equilibrium with its saturated solution by using Thorium B as a radioactive indicator originated with F. Paneth.[1] It was intended to apply his method to a study of the internal structural changes accompanying the aging of freshly formed precipitates of lead sulfate. However, since we cannot agree with some of the conclusions derived by the above authors from their experimental work, it was decided to make a more extensive study of the specific surface and the adsorbent properties of aged lead sulfate. The results of this study which yielded new information will be described in the following.

Materials Used.—All chemicals were c. p. products and as a rule three times recrystallized from water.

Lead Sulfate.—Coarsely crystalline products were prepared according to the directions of Paneth and Vorwerk.[1] 2 *N* sulfuric acid was added slowly to a solution of 95 g. of lead nitrate in 7 liters of water, the whole being well stirred during the mixing. The precipitate was washed ten times by decantation with 10-liter portions of distilled

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[1] F. Paneth, *Z. Elektrochem.*, **28**, 113 (1922); Paneth and W. Vorwerk, *Z. physik. Chem.*, **101**, 445 (1922).