The data obtained included only two values which deviated as much as this from what seemed to be the best curve passed through these data and those of Parks, Huffman and Barmore in the neighboring temperature region. Check measurements of the heat capacity of water over this same temperature region gave values which agreed with those accepted by Dorsey[7] within these limits.

In an earlier series of measurements on a different sample of sucrose values were obtained which scattered widely. In making these earlier measurements the sucrose had been exposed to temperatures near 90° for more than two weeks by the time the final measurements were made. By this time the value of the heat capacity of sucrose at 20° had increased to a value about 15% higher than the values obtained earlier or those reported by Parks, Huffman and Barmore. When the sample container was opened it was found that the sucrose had caramelized to a solid brown mass.

It is of interest that the sucrose caramelized at temperatures well below the decomposition value of 186° given in the handbook.[8]

When the measurements reported here were made only three determinations were carried out above 45° and these in the shortest possible time. After completion of the measurements a check determination of the heat capacity at room temperature gave a value in agreement with the other values within the estimated uncertainty of the measurements. When the sample container was opened it was found that the sucrose was still powdery and white and that there was no visible evidence of decomposition.

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(7) N. E. Dorsey, "Properties of Ordinary Water Substance," Reinhold Publishing Corp., New York, N. Y., p. 613 and 616.

(8) "Handbook of Chemistry and Physics," 29th edition, Chemical Rubber Publishing Co., p. 1019; see, however, Circular C440 (*loc. cit.*) p. 398.

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# The Heat of Solution of Sucrose in Water at 25°[1]

BY HOWARD HIGBIE[2] AND GEBHARD STEGEMAN[3]

Measurements of the quantities needed for a thermal description of the system sucrose–water are being made in this Laboratory.[4] This paper presents measurements of the heat of solution of sucrose in water at 25° and an evaluation of the heat of solution at infinite dilution at this temperature.

## Experimental

The sucrose was Standard Sample 17 prepared by the National Bureau of Standards.[5] This was received in a highly purified condition and was used without further treatment. Distilled water was used as the solvent.

The apparatus and operating techniques have been described.[6] The apparatus was a twin Joule solution calorimeter holding about a liter of water in each side and having sensitivity limits of about ± 0.02 cal on the basis of the sensitivity limits of the 25 junction thermel–galvanometer combination.

The values obtained for the heat of solution of sucrose in water at 25° are tabulated below. The heat of solution at infinite dilution was evaluated from the relation

$$\overline{H}_2^0 - H_2^s = Q/n_2 - 55.51L_1/m - L_2$$

where $\overline{H}_2^0 - H_2^s$ is the heat of solution at infinite dilution, $Q/n_2$ is the heat absorbed per mole of sucrose dissolved, $m$ is the molality of the final solution and $\overline{L}_1$ and $\overline{L}_2$ are the relative partial molal heat contents of the water and sucrose in solution. The values of $\overline{L}_1$ and $\overline{L}_2$ at the indicated molalities were obtained from the empirical expressions given by Gucker, Pickard and Planck.[7]

| Sucrose dissolved, mole | Concn. of final soln., molality | Heat absorbed, cal./mole$^{-1}$ | $H_2 - H_2$, cal./mole |
|---|---|---|---|
| 0.008214 | 0.008237 | 1453 | 1452 |
| .008555 | .008579 | 1462 | 1461 |
| .007921 | .007943 | 1448 | 1447 |
| .008103 | .008126 | 1468 | 1467 |
| .007671 | .007692 | 1447 | 1446 |
| | | Mean value | 1455 ± 5 |

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[1] This work was supported by a grant to the University of Pittsburgh from The Sugar Research Foundation Inc. and is a portion of the dissertation presented by Howard Higbie to the Graduate School of the University of Pittsburgh in partial fulfillment of the requirements for the degree of Doctor of Philosophy.

[2] The M. W. Kellogg Co., Jersey City 3, N. J.

[3] Deceased September 5, 1949.

[4] Anderson, Higbie, and Stegeman, THIS JOURNAL, **72**, 3798 (1950).

(5) Circular C 440, U. S. Department of Commerce, National Bureau of Standards, page 392.

(6) Fineman and Wallace, THIS JOURNAL, **70**, 4165 (1948).

(7) Gucker, Pickard and Planck, *ibid.*, **61**, 459 (1939).

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JERSEY CITY 3, N. J. RECEIVED FEBRUARY 11, 1950

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# The Preparation and Structure of Lanthanum Cobaltic Oxide

BY FRED ASKHAM,[1] I. FANKUCHEN AND ROLAND WARD[2]

The existence of the perowskite-like compound of approximate composition $BaFeO_{2.63}$[3] suggests that it might be possible to prepare a similar compound of cobalt. Since no such compound was found, the substitution of lanthanum for barium was tried. Naray-Szabo[4] has prepared $LaMnO_3$ and $LaFeO_3$ by heating oxides of manganese and iron with lanthanum oxide and has shown that the products were of the perowskite type. Hedvall,[5] however, reported that no compounds were formed when lanthanum and cobaltous oxides were heated together at 1100 to 1300°.

## Experimental

Intimate mixtures of the hexahydrates of lanthanum and cobaltous nitrates were heated in a tube furnace in a stream

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[1] Abstracted from a thesis submitted to the Graduate School of the Polytechnic Institute of Brooklyn by Fred Askham in partial fulfillment of the Master of Science degree 1950.

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[3] M. Erchak, Jr., I. Fankuchen and R. Ward, THIS JOURNAL, **68**, 2085 (1946).

[4] I. Naray-Szabo, *Naturwissenschaften*, **31**, 466 (1943).

[5] J. A. Hedvall, *Z. anorg. allgem. Chem.*, **93**, 313 (1915).