The Heats of Dilution of Aqueous Solutions of Glycine at 25°

BY JULIAN M. STURTEVANT

In connection with other calorimetric work in progress in this Laboratory it became necessary to determine the heats of dilution of aqueous solutions of glycine at 25°. Glycine which had been carefully purified by Owen[1] was used after being dried for several days at 100°. The calorimeter and experimental procedure have been described[2] elsewhere. The specific heat data for glycine solutions given by Gucker, Ford and Moser,[3] and the value for the specific heat of water at 25° due to Osborne, Stimson and Ginnings[4] were used in the calculations.

The experimental data are summarized in Table I. Values of the relative apparent molal heat content, $\Phi_H - \Phi^0_H$, were obtained by extrapolation of the experiments with the 1.1407 *M* and 0.9670 *M* solutions to infinite dilution, assuming linearity with the first power of the molality in dilute solutions. These values are plotted in Fig. 1 against the molality of the glycine. The smooth curve in this plot is given by the expression

TABLE I

THE HEATS OF DILUTION OF AQUEOUS SOLUTIONS OF GLYCINE AT 25°

Initial molality	Final molality	Heat of dilution int. joules per mole	Deviation from Eq. (1) Joules per mole	Microvolts
1.1407	0.0366	401.1	+6.7	+0.04
1.1407	.0496	384.4	−3.9	− .03
1.1407	.0967	369.5	+3.0	+ .05
1.1407	.1660	335.0	−0.8	− .02
0.4316	.0361	156.8	−9.0	− .05
.8291	.0700	285.7	−0.1	0
.8291	.0805	279.3	−1.7	−0.02
.9670	.0253	354.6	+5.4	+ .02
.9670	.0378	335.5	−7.8	− .05
.9670	.0434	338.2	−2.5	− .02
.9670	.0577	335.5	+1.6	+ .02
.9670	.0724	323.7	−3.4	− .04
		Mean	±3.8	± .03

$$\Phi_H - \Phi^0_H = \frac{-485m}{1 + 0.395m} - 23.7m^2 \qquad (1)$$

The experimental values show an average deviation from this curve of ±4 joules per mole. Values of the heats of dilution, Φ_H (final) − Φ_H (initial), calculated from this equation show an average deviation from the experimental values corresponding to an error in the temperature change measurements of ±0.03 microvolt (approximately 40 microdegrees), which is about the error to be expected with the temperature measuring device used.

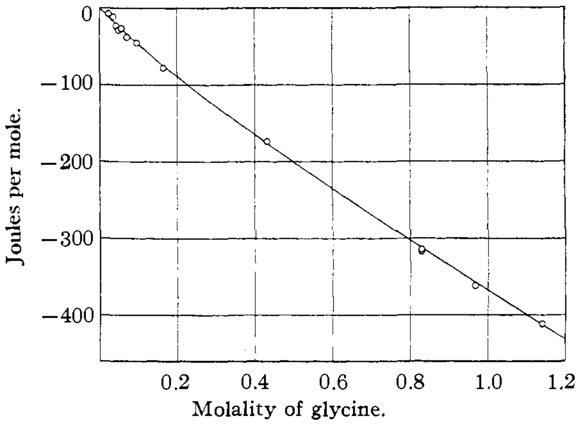

Fig. 1.—Relative apparent molal heat content of glycine solutions at 25°.

The last five runs were made under conditions designed to ensure the exclusion of carbon dioxide from the solutions. It is seen that these runs are consistent with the others in which no special precautions were taken beyond employing boiled, distilled water which had been cooled in an atmosphere of tank nitrogen.

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[1] Owen, THIS JOURNAL, **56**, 24 (1934).

[2] Sturtevant, *J. Phys. Chem.*, in press; THIS JOURNAL, **62**, 584 (1940).

[3] Gucker, Ford and Moser, *J. Phys. Chem.*, **43**, 153 (1939).

[4] Osborne, Stimson and Ginnings, *Bur. Standards J. Research*, **23**, 197 (1939).

Quantum Yield in Chloroacetic Acid

BY LLOYD B. THOMAS

Rudberg[1] has determined the quantum yield for the hydrolysis of monochloroacetic acid to be 1.05 chloride ions produced per absorbed quantum of λ 2537 and offered this in support of the Einstein Law of Photochemical Equivalence. This system has since been widely used as a standard actinometer for photochemical reactions. Harris and Kaminsky[2] have used their "precision actinometer" to check Rudberg's value and obtained a quantum yield of 1.07 with an accuracy within 5.5%. Smith, Leighton and Leighton[3] have repeated the determination with the startling result that the quantum yield at 25° is 0.315. It seems important that this value be checked.

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[1] Rudberg, *Z. Physik*, **24**, 247 (1924).

[2] Harris and Kaminsky, THIS JOURNAL, **57**, 1158 (1935).

[3] Smith, Leighton and Leighton, *ibid.*, **61**, 2299 (1939).