

Solubility of Iodine in Dimethylsulfoxide

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SOLUBILITY of iodine in dimethylsulfoxide (DMSO) has been measured at temperatures from 27° to 38° C. The results are reported in Table I.

EXPERIMENTAL

Dimethylsulfoxide (Stepan Chemical Co., Chicago, Ill.) was distilled once before use. Resublimed iodine from Fisher and Mallinckrodt was used without further purification. Anhydrous sodium thiosulfate (Fisher certified reagent), potassium iodide (Baker analyzed reagent), and Thyodene indicator (Fisher) were also used without further treatment.

Two-milliliter samples of dimethylsulfoxide were placed in large test tubes, saturated with excess iodine, and the test tubes sealed by a flame. The tubes were then placed in a Precision temperature bath ($\pm 0.02^\circ$) equipped with a mechanical shaker for time intervals varying from 2 days to 4 weeks.

A 1-ml. aliquot of the equilibrated solution was added to a previously weighed amount of potassium iodide solution. The iodine-dimethylsulfoxide-potassium iodide solution was weighed, and the weight of the aliquot was determined by difference. In order to determine the amount of iodine, the iodine-dimethylsulfoxide solution in potassium iodide was titrated with standard thiosulfate solution using Thyodene as an indicator. The average precision of the results was approximately 1%.

Each value, except those at 27°, 32°, and 36°, represents an average of seven determinations. Nine determinations were made at 36° and 10 at the other two temperatures.

DISCUSSION

The solubilities presented in Table I were fitted to the equation

$$\ln x_2 = -433.2/T + 0.8511$$

by the method of least squares using an IBM 650 digital computer. The differential heat of solution of iodine from these data is 861 ± 3 cal. per mole.

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Table I. Solubility of Iodine in Dimethylsulfoxide

$T, ^\circ \text{K.}$	x_2 , Mole Fraction of Iodine
300.2	0.550
301.3	0.556
303.2	0.563
305.2	0.569
307.2	0.573
309.2	0.578
311.2	0.579