

Enthalpies of fusion and heat capacities for ice and tetrahydrofuran (THF) hydrate in the range 85 to 270 K

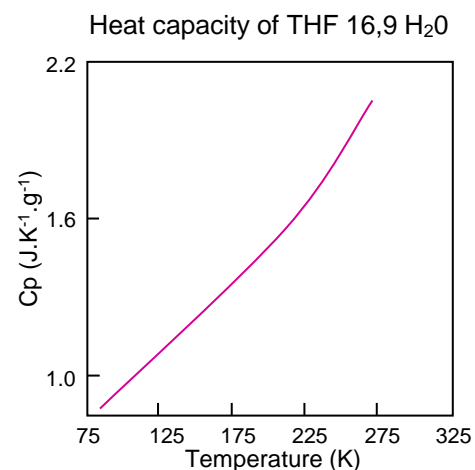
Reference: Enthalpies of fusion and heat capacities for ice and tetrahydrofuran (THF) hydrate in the range 85 to 270 K. Y.P. HANDA, R.E. HAWKINS and J.J. MURRAY, J. Chem. Thermodynamics 16, 1984, 623-632

Introduction

Clathrate hydrates are non-stoichiometric solid compounds in which individual « guest » atoms or molecules of suitable size and shape are held in the cavities provided by the hydrogen-bonded lattice of the « host » water molecules. Recent reports that large reserves of natural gas are present as clathrate hydrates in permafrost regions and beneath the oceans have generated interest in the study of their thermophysical properties such as heat capacity and thermal conductivity. An understanding of such properties will be required regardless of the production scheme used to recover natural gas from these deposits.

T/K	Cp/(J.K ⁻¹ .g ⁻¹)		T/K	Cp/(J.K ⁻¹ .g ⁻¹)		T/K	Cp/(J.K ⁻¹ .g ⁻¹)	
	Ice	THF hydrate		Ice	THF hydrate		Ice	THF hydrate
85	0.742	0.841	150	1.223	1.219	220	1.696	1.627
90	0.785	0.907	160	1.291	1.262	230	1.776	1.776
100	0.864	0.964	170	1.364	1.324	240	1.855	1.855
110	0.948	1.005	180	1.417	1.373	250	1.925	1.925
120	1.023	1.054	190	1.491	1.435	260	2.014	2.014
130	1.092	1.106	200	1.557	1.489	270	2.097	2.097
140	1.154	1.156	210	1.635	1.561			

Table 1



Experimental

For Cp measurements, the sample weighed about 11 g and occupied 90-95 % of the volume of the cell. The measurement cell containing the sample was transferred to the calorimeter which had been cooled to 10 K below the melting temperature of the sample. The calorimeter was subsequently cooled to 78 K over a period of 8 h and kept at this temperature for another 4 h before starting the run.

All the tests were made at a rate of 0,0025K/s. Each sample run was followed by a blank run (both cells empty) with no change in operating conditions, except that no pre-cooling of the calorimeter was required.

Results and conclusions

Enthalpies of fusion and heat capacities between 85 and 270 K are reported for ice and tetrahydrofuran hydrate and compared with literature values.

All the values were obtained by using a Tian-Calvet low temperature heat-flow calorimeter BT 2.15 calibrated in the range 85 to 290 K using synthetic sapphire.

The accuracy of the heat-capacity measurements is 1.5 per cent between 85 and 100 K and 1 per cent above 100 K (Table 1).

Enthalpies of fusion are accurate to 1 per cent.

For more details, ask for the publication B0428.

BT 2.15
-196 °C to 200 °C



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