

## Note

STANDARD ENTHALPY OF FORMATION OF THE MONOCLINIC FORM OF  $\text{Cs}_2\text{CdI}_4$ 

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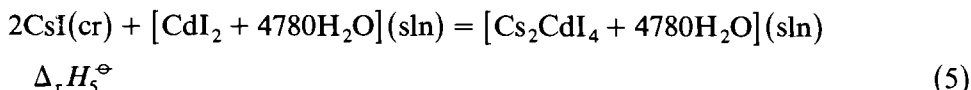
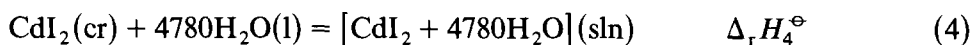
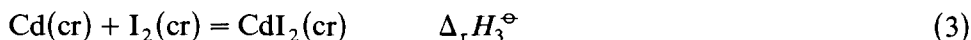
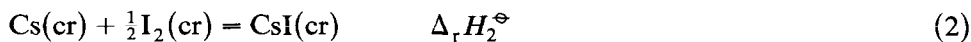
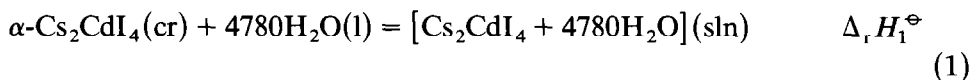
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Dicaesium cadmium tetraiodide  $\text{Cs}_2\text{CdI}_4$  has two polymorphic forms at room temperature depending on its preparation [1,2]. When prepared from an aqueous equimolar solution of  $\text{CsI}$  and  $\text{CdI}_2$ , the monoclinic  $\alpha$ -phase is obtained with a  $\text{Sr}_2\text{GeS}_4$ -type structure. Above 400 K, it undergoes a phase transformation to an orthorhombic modification which is isotypic with  $\text{K}_2\text{SO}_4$  [3,4]. In this paper the standard enthalpy of formation of  $\alpha$ - $\text{Cs}_2\text{CdI}_4$  is reported as calculated from the results of solution calorimetry.

Calorimetric measurements were made of the enthalpy of solution of  $\alpha$ - $\text{Cs}_2\text{CdI}_4$  in pure water and of  $\text{CsI}$  in an aqueous  $\text{CdI}_2$  solution. The masses of  $\alpha$ - $\text{Cs}_2\text{CdI}_4$  and  $\text{CsI}$  dissolved were about 60 and 40 mg respectively, so that the molality of  $\text{Cs}_2\text{CdI}_4$  was  $1.163 \times 10^{-2} \text{ mol kg}^{-1}$  in the resulting solutions. The measurements were carried out at 298 K using a Calvet microcalorimeter, the design of which has been described [5]. The general procedure and the calibration have been published [6].

The enthalpy of formation of  $\alpha$ - $\text{Cs}_2\text{CdI}_4$  was calculated from the reaction enthalpies of the following reactions



The mean values of  $\Delta_r H_1^\ominus$  and  $\Delta_r H_5^\ominus$ , obtained from eight calorimeter measurements of each quantity, are  $89.33 \pm 0.88 \text{ kJ mol}^{-1}$  and  $62.78 \pm 0.60 \text{ kJ mol}^{-1}$  respectively, the uncertainties being twice the standard deviation of the means. Values of  $\Delta_r H_2^\ominus$ ,  $\Delta_r H_3^\ominus$  and  $\Delta_r H_4^\ominus$  were taken from the

literature:  $\Delta_r H_2^\ominus = -348.14 \pm 0.16 \text{ kJ mol}^{-1}$  [7];  $\Delta_r H_3^\ominus = -204.18 \pm 3.35 \text{ kJ mol}^{-1}$  [8];  $\Delta_r H_4^\ominus = 10.38 \pm 0.08 \text{ kJ mol}^{-1}$  [9,10].

Based on the following equation

$$\Delta_f H_{\alpha\text{-Cs}_2\text{CdI}_4(\text{cr})}^\ominus = 2\Delta_r H_2^\ominus + \Delta_r H_3^\ominus + \Delta_r H_4^\ominus + \Delta_r H_5^\ominus - \Delta_r H_1^\ominus \quad (6)$$

the enthalpy of formation of  $\alpha\text{-Cs}_2\text{CdI}_4$  was calculated to be  $\Delta_f H_{\alpha\text{-Cs}_2\text{CdI}_4(\text{cr})}^\ominus = -916.63 \pm 3.53 \text{ kJ mol}^{-1}$ .

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