

Thermische Zersetzung und Lösungskalorimetrie von Ammoniumeuropiumchloriden

Thermal Decomposition and Solution Calorimetry of Ammonium Europium Chlorides

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The thermal decomposition equilibria of ammonium europium chlorides $(\text{NH}_4)_3\text{EuCl}_6$, $(\text{NH}_4)_2\text{EuCl}_5$ and $\text{NH}_4\text{Eu}_2\text{Cl}_7$ have been investigated by total pressure measurements in a membrane zero manometer. The thermodynamic data of these solid phases have been derived from the decomposition functions. The standard enthalpies of solution in $4n \text{ HCl (aq.)}$ of $(\text{NH}_4)_3\text{EuCl}_6$, $(\text{NH}_4)_2\text{EuCl}_5$, $\text{NH}_4\text{Eu}_2\text{Cl}_7$, EuCl_3 and Eu_2O_3 were measured. On the basis of these values and tabulated data, the standard enthalpies at 298 K of the ammonium europium chlorides were derived and compared with the obtained results from the total pressure measurements.

Data by total pressure measurement:

$$\begin{aligned}\Delta H_{\text{B}}^{\circ}((\text{NH}_4)_3\text{EuCl}_{6,\text{f},298}) &= -448,7 \pm 5,1 \text{ kcal/mol;} \\ S^{\circ}((\text{NH}_4)_3\text{EuCl}_{6,\text{f},298}) &= 118,9 \pm 8,3 \text{ cal/K}\cdot\text{mol;} \\ \Delta H_{\text{B}}^{\circ}((\text{NH}_4)_2\text{EuCl}_{5,\text{f},298}) &= -377,3 \pm 4,5 \text{ kcal/mol;} \\ S^{\circ}((\text{NH}_4)_2\text{EuCl}_{5,\text{f},298}) &= 85,4 \pm 7,6 \text{ cal/K}\cdot\text{mol;} \\ \Delta H_{\text{B}}^{\circ}(\text{NH}_4\text{Eu}_2\text{Cl}_{7,\text{f},298}) &= -519,8 \pm 3,5 \text{ kcal/mol;} \\ S^{\circ}(\text{NH}_4\text{Eu}_2\text{Cl}_{7,\text{f},298}) &= 94,2 \pm 5,5 \text{ cal/K}\cdot\text{mol.}\end{aligned}$$

Data by solution calorimetry:

$$\begin{aligned}\Delta H_{\text{B}}^{\circ}(\text{EuCl}_{3,\text{f},298}) &= -218,3 \pm 0,8 \text{ kcal/mol;} \\ \Delta H_{\text{B}}^{\circ}((\text{NH}_4)_3\text{EuCl}_{6,\text{f},298}) &= -444,6 \pm 1,2 \text{ kcal/mol;} \\ \Delta H_{\text{B}}^{\circ}((\text{NH}_4)_2\text{EuCl}_{5,\text{f},298}) &= -374,0 \pm 1,1 \text{ kcal/mol;} \\ \Delta H_{\text{B}}^{\circ}(\text{NH}_4\text{Eu}_2\text{Cl}_{7,\text{f},298}) &= -513,6 \pm 1,8 \text{ kcal/mol.}\end{aligned}$$

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