

Calorimetric Investigation of NdI₃-MI Liquid Systems

(M = Li, Na, K, Rb, Cs)

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The molar enthalpies of mixing, $\Delta_{\text{mix}} H_{\text{m}}$, of the liquid alkali metal iodide – neodymium iodide binary systems have been measured over the whole composition range at 1068 K with an accuracy of about 6%. The apparatus used was a Calvet – type high – temperature microcalorimeter. In all the systems under investigation the enthalpies of mixing are negative, with minimum values close to –1.1, –4.8, –10.3, –16.2, and –20.0 kJ mol^{–1} for LiI-NdI₃, NaI-NdI₃, KI-NdI₃, RbI-NdI₃, and CsI-NdI₃, respectively, at the mole fractions $x_{\text{NdI}_3} \cong 0.30 - 0.40$ except the LiI-NdI₃ system, where it is at the NdI₃-rich compositions. The molar enthalpies of formation $\Delta_{\text{form}} H_{\text{m}}$ at 1068 K for M = Li, Na, K, Rb, and Cs, arising from the reaction $3 \text{MI}_{(l)} + \text{NdI}_{3(l)}$, are found to be –4.5, –17.5, –39.1, –59.9, and –73.3 kJmol^{–1}, respectively. They are compared with the formation enthalpies determined previously for the (3MCl, NdCl₃) and (3MBr, NdBr₃) liquid mixtures. These enthalpies become less negative with increase of the radius of the halide ion.

Key words: Calorimetry; Mixing Enthalpy; Formation Enthalpy; Neodymium Iodide;
Alkali Metal Iodides.