Ternary System Bi/Se/O, Bi$_2$O$_2$Se, Total Pressure Measurements, Enthalpy of Formation, Standard Entropy

Only the ternary phase Bi$_2$O$_2$Se is shown to exists in the thermodynamical equilibrium in the investigated ternary system on the binary line Bi$_2$O$_3$–Bi$_2$Se$_3$. Its thermal decomposition was measured in a quartz membrane zero manometer. The enthalpy of formation and the standard entropy were derived from the temperature function of the decomposition equilibrium:

$$\Delta H^\circ_{\text{f}}(\text{Bi}_2\text{O}_2\text{Se}, 298) = -104.6 \pm 4.0 \text{ kcal/mol}$$

$$S^\circ(\text{Bi}_2\text{O}_2\text{Se}, 298) = 43 \pm 3 \text{ cal/K·mol.}$$

The coexistence ranges in the ternary region Bi$_2$O$_3$–SeO$_2$–Bi$_2$O$_2$Se–Se were followed by X-ray diffraction, IR spectroscopy and total pressure measurements of binary and ternary compositions.