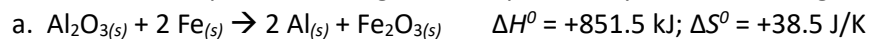


1) Discuss the effect of temperature change on the spontaneity of the following reactions at 1 atm.



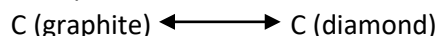
2) For the reaction: $\text{SnO}_{2(s)} + 2 \text{CO}_{(g)} \rightarrow 2 \text{CO}_{2(g)} + \text{Sn}_{(s)}$ (White tin $S^0 = 52 \text{ J/K}\cdot\text{mol}$)
Calculate the temperature at which $\Delta G^0 = 0$.

3) For the decomposition for Ag_2O : $2 \text{Ag}_2\text{O}_{(s)} \rightarrow 4 \text{Ag}_{(s)} + \text{O}_{2(g)}$

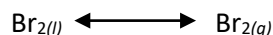
a. Obtain an expression for ΔG^0 as a function of temperature. Prepare a table of ΔG^0 values at 100-K intervals between 100 K and 500 K.

b. Calculate the temperature at which ΔG^0 becomes zero.

4) Pencil “lead” is almost pure graphite. Graphite is the stable elemental form of carbon at 25°C and 1 atm. Diamond is an allotrope of graphite. Given diamond: $\Delta H_f^0 = 1.9 \text{ kJ/mol}$; $S^0 = 2.4 \text{ J/mol}\cdot\text{K}$ at what temperature are the two forms in equilibrium at 1 atm?



5) Given the following data for bromine, estimate the normal boiling point of bromine.



$$\text{Br}_{2(l)}: S^0 = 152.2 \text{ J/mol}\cdot\text{K}$$

$$\text{Br}_{2(g)}: S^0 = 245.4 \text{ J/mol}\cdot\text{K}$$

$$\Delta H_f^0 = 30.91 \text{ kJ/mol}$$