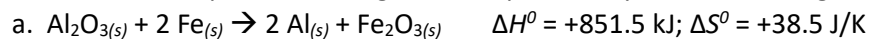


1) Discuss the effect of temperature change on the spontaneity of the following reactions at 1 atm.



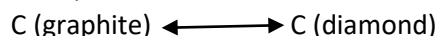
2) For the reaction: $\text{SnO}_{2(s)} + 2 \text{CO}_{(g)} \rightarrow 2 \text{CO}_{2(g)} + \text{Sn}_{(s)}$
Calculate the temperature at which $\Delta G^\circ = 0$.

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° as a function of temperature. Prepare a table of ΔG° values at 100-K intervals between 100 K and 500 K.

b. Calculate the temperature at which ΔG° 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: $\Delta H_f^\circ = 1.9 \text{ kJ/mol}$; $S^\circ = 2.4 \text{ J/mol} \cdot \text{K}$ 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.



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

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

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