

Honors Chemistry - Free Energy Calculations

Calculate ΔG for the following processes. Indicate if it is spontaneous at the given temperature. If it is not spontaneous, calculate the temperature that it would become spontaneous, if there is one. Or, if it is spontaneous at the given temperature but there is a temperature above or below which it would become nonspontaneous, calculate that instead.

1. $\Delta H = -55.0 \text{ kJ}$ $\Delta S = -80 \text{ J/K}$ $T = 400 \text{ K}$

2. $\Delta H = -172.0 \text{ kJ}$ $\Delta S = 140 \text{ J/K}$ $T = 300 \text{ K}$

3. $\Delta H = 120.0 \text{ kJ}$ $\Delta S = -60 \text{ J/K}$ $T = 600 \text{ K}$

4. $\Delta H = 220.0 \text{ kJ}$ $\Delta S = 300 \text{ J/K}$ $T = 400 \text{ K}$

What is the value of ΔG for any physical state change at equilibrium? _____

What is the corresponding equation for calculating the physical state change temperature? _____

Phenol, $\text{C}_6\text{H}_5\text{OH}$, has a heat of vaporization of 57.8 kJ/mol , and a boiling point of 182°C . What is ΔS for the vaporization of phenol?