Solutions (Assignment Week-6)

A-1

\[ \Delta A = \Delta U - T \Delta S \]

If \( \Delta S > 0 \), some energy can flow into the system (as long as \( \Delta S_{\text{sys}} + \Delta S_{\text{sur}} > 0 \)) and add up to work.

\[ \therefore (c) \]

A-2

\[ \Delta G = \Delta H - T \Delta S \] (maximum now F.V work)

\[ \therefore (A) \]

A-3

\[ \oint_{\text{row}} dU = T dS - p dV \]

\[ \left( \frac{\partial T}{\partial V} \right)_S = - \left( \frac{\partial p}{\partial S} \right)_V \]

\[ \therefore (A) \]

A-4

\[ dU = T dS - p dV \] applies to both reversible and irreversible changes because \( U \) is a state property.

\[ \therefore (c) \]

(A), (B), and (C) all together can also be accepted.

A-5

\[ \Delta G^\circ = \sum_j \Delta_f G^\circ (J) = \sum_j \Delta_f H^\circ (J) - T \sum_j \Delta_f S^\circ (J) \]

\[ \therefore (B) \text{ and } (D) \]
ΔG = nRT ln \frac{b_i}{p_i} = 298 \text{ R} \ln 10 \quad (B)

Maximum disorder exists in gaseous state.

Hence (A).

\[
\frac{\partial G}{\partial p} = V \quad \Rightarrow \quad V(g) \text{ is maximum.} \quad \therefore (B)
\]

\[
\mu = \left( \frac{\partial G}{\partial m} \right)_{T, P} = \left( \frac{\partial m \gamma_m}{\partial m} \right)_{T, P} = \gamma_m
\]

\therefore (B)

\[
\text{Since } \left( \frac{\partial G}{\partial p} \right) = V
\]

For water, \( V(\text{ice}) > V(\text{liquid water}) \)

\[\therefore \Delta G(\text{ice}) > \Delta G(\text{liquid water}) \quad (B)\]