## Daily Tutorial Sheet-4 | Level-1

**46.(ABCD)** For an isothermal process, $\Delta E = 0, \Delta H = 0$

$$\Delta S = nC_{p,m} \ln \frac{T_2}{T_1} + nR \ln \frac{P_1}{P_2} = 0$$

**47.(D)** $\underset{+4}{PbO_2} + \underset{0}{Pb} \longrightarrow \underset{+2}{2PbO}$

Since, $\Delta_r G° < 0$ , hence + 2 state of lead is favourable.

$\underset{+4}{SnO_2} + \underset{0}{Sn} \longrightarrow \underset{+2}{2SnO}$

Since, $\Delta_r G° > 0$ , it means forward reaction is not spontaneous.

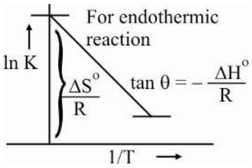
$\underset{+2}{2SnO} \longrightarrow \underset{+4}{SnO_2} + \underset{0}{Sn}$

For this $\Delta_r G° < 0$ , thus $+4$ state of tin is favourable.

**48.(B)** $\Delta G° = -RT \ln K$

or, $\Delta H° - T\Delta S° = -RT \ln K$ or, $\ln K = \frac{-\Delta H°}{RT} + \frac{\Delta S°}{R}$

Comparing with y = m.x + c $\therefore$ y intercept is $\frac{\Delta S°}{R}$



**49.(D)** The standard free energy change $(\Delta G°)$ is related to equilibrium constant K as

$\Delta G° = -RT \ln K$ ; $\Delta G° = -2.303\ RT \log K$

**50.(B)** $\because\ \Delta G° = \Delta H° - T \cdot \Delta S° = -29.8 - 298 \times (-0.1) = -29.8 + 29.8 = 0$

**51.(A)** The unit of entropy is $J\,mol^{-1}\,K^{-1}$.

**52.(A)** For a system in equilibrium, $\Delta G = 0$, when all the reactants and products are in the standard state [at constant temperature and pressure].

**53.(A)** $H_2(g) + Cl_2(g) \longrightarrow 2HCl(g)\ \Delta S° = \Sigma S_p^{\circ} - \Sigma S_R^{\circ} = 2 \times 187 - (131 + 223) = 374 - 354 = 20\,JK^{-1}\,mol^{-1}$

**54.(A)** Given, $\Delta H = 31400$ cal , $\Delta S = 32\,cal\,K^{-1}\,mol^{-1}$, $T = 1000 + 273 = 1273K$ , $\Delta G = ?$

From Gibb's-Helmholtz equation

$\Delta G = \Delta H - T \cdot \Delta S = 31400 - 1273 \times 32 = 31400 - 40736 = -9336\,cal$

**55.(C)** For spontaneous adsorption process, standard Gibb's free energy $(\Delta G)$ must be negative as well as the degree of randomness of gas molecule on the surface of solid decreases. For exothermic process, $\Delta H$ must be negative. Hence, with the help of following equation.

$\Delta H = \Delta G + T \cdot \Delta S$

$T \cdot \Delta S$ is negative. Thus, during adsorption $\Delta S$ decreases.

**56.(B)** $\Delta_{vap}S° = \frac{\Delta_{vap}H°}{T}$; $\Delta_{vap}S° = \frac{40.8 \times 10^3}{373} = 109.4\,JK^{-1}\,mol^{-1}$

**57.(D)** As we know that, $\Delta G = \Delta H - T\Delta S$

Hence, $\Delta G$ may be greater, lesser or equal to $\Delta H$.

**58.(D)** For a reversible process $\Delta S_{system} + \Delta S_{surroundings} = 0$

**59.(A)** $\Delta U = q + w = 0$ for cyclic process.

**60.(A)** $|w| = P_2(V_2 - V_1) + P_3(V_3 - V_2)$