

- 116.(B)** For a reaction to be spontaneous ΔG must be negative. According to relationship of ΔG ,

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

If ΔH and ΔS both are positive, then term $T \cdot \Delta S$ will be greater than ΔH at high temperature and consequently ΔG will be negative at high temperature. (Boiling point of water) and reaction becomes feasible.

- 117.(B)** Entropy of vapour is higher than liquid higher than solid.

- 118.(C)** $\Delta G = \Delta H - T \Delta S$

If $\Delta G = -ve \Rightarrow$ reaction is spontaneous $\Delta H > 0$ and $\Delta S > 0$

It implies that entropy term can make ΔG negative which is possible at higher temperature.

- 119.(A)** $\Delta G = \Delta H^\circ - T\Delta S^\circ = \left(179.1 - \frac{298 \times 160.2}{1000} \right) \text{ kJ / mol} = 179.1 - 47.74 = 131.36 \text{ kJ} = +ve$

\Rightarrow non-spontaneous at 298K.

Let at T, reaction is spontaneous.

$$\Delta G \leq 0 \Rightarrow \Delta H - T\Delta S \leq 0$$

$$T \geq \frac{\Delta H}{\Delta S} = \frac{179.1 \times 1000}{160.2} \text{ K}$$

$$T \geq 1118 \text{ K}$$

- 120.(D)** $\frac{1}{2} X_2 + \frac{3}{2} Y_2 \rightleftharpoons XY_3$

$$\Delta S = 50 - \left(\frac{1}{2} \times 60 + \frac{3}{2} \times 40 \right) = 50 - 90 = -40 \text{ kJ / mol}$$

$$\Delta G = 0 = -30 \times 10^3 - T \times (-40)$$

$$40T = 30 \times 10^3 \Rightarrow T = 750 \text{ K}$$

- 121.(C)** $\Delta G = \Delta G^\circ + RT \ln Q$

At equilibrium $\Delta G = 0$ and $\Delta G^\circ = \Delta H - T \Delta S^\circ$ and $Q = K$

$$\ln K = - \frac{\Delta H^\circ - T \Delta S^\circ}{RT}$$

- 122.(D)** $\Delta S = -ve$

$$\Delta H = -ve$$

$$\Delta G = \Delta H - T\Delta S$$

For a reaction to be spontaneous ; $\Delta G = -ve$ which can be below a certain temperature only

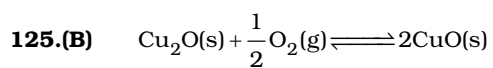
- 123.(B)** $\Delta G = \Delta H - T\Delta S = -2808 - 310 \times 182.4 \times 10^{-3} = -2864.5 \text{ kJ}$

- 124.(A)** Since, expansion occurred at constant temperature,

$$\Delta S = nR \ln \frac{V_2}{V_1} = \frac{1}{32} \times 8.314 \ln \frac{3.0}{0.75} = 0.36 \text{ JK}^{-1}$$

Since, this is case of free expansion, $P_{\text{ext}} = 0 \Rightarrow -W = P_{\text{ext}} \Delta V = 0, q = 0$

Also, since, $\Delta T = 0 \Rightarrow \Delta H = \Delta E = 0$.



$$\Delta G_{\text{reaction}}^{\circ} = [2 \times (-30.4)] - (-34.98) = -25.82 \text{ kcal}$$

$$\text{and } -25.82 \times 10^3 = -2.303 \times 2 \times 298 \log K$$

$\therefore K \approx 10^{19}$, a very high value, hence reaction will be almost complete with a trace of Cu_2O .