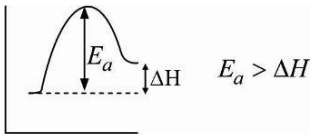
Daily Tutorial Sheet-1	JEE Main (Archive)

1.(C)



$E_a > \Delta H$

2.(BD) Refractive index depend only on nature of substance

3.(BCD) In B, C, D, energy is required

4.(C) A reversible process is that in which system and surroundings are always in equilibrium.

5.(A) Work and heat are path function

6.(C) $\Delta H = nC_p\Delta T$

7.(A) Work and heat are path function.

8.(AB) Molar conductivity and emf. are intensive properties

9.(A) $w = -2.303nRT\log\dfrac{v_f}{v_i}$

10.(D) $\Delta G_r^o = -RT\ln K_p$

11.(D) For adiabatic process : q = 0

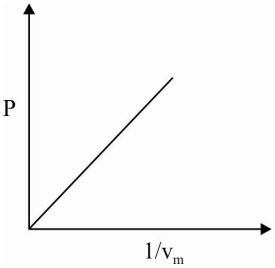
So from Ist law $\Delta U = q + w$

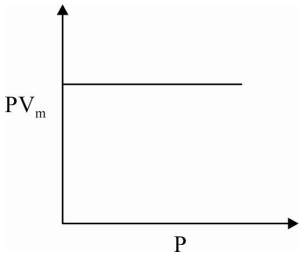
We can write $\Delta U = w$

12.(A) Isothermal T = constant

PV_m = constant PV_m will remain constant with increase of pressure

$P = k \times \dfrac{1}{V_m}$ Pressure will increase linearly with increase in 1/Vm





13.(D) For reversible isothermal expansion of an ideal gas :

$w = -nRT\ln\dfrac{V_2}{V_1}$ $\begin{pmatrix} V_2 \rightarrow \text{Final volume} \\ V_1 \rightarrow \text{Initial volume} \end{pmatrix}$

$\therefore \quad |w| = nRT\ln\dfrac{V_2}{V_1}$

$|w| = nRT\ln V_2 - nRT\ln V_1$

So in a graph of $|w|$ versus $\ln V_2$, the intercept cannot be positive.

14.(A) Overall process

$$\underset{273K}{H_2O(ice)} \xrightarrow{a} \underset{273K}{H_2O(\ell)} \xrightarrow{b} \underset{373K}{H_2O(\ell)} \xrightarrow{c} \underset{373K}{H_2O(g)} \xrightarrow{d} \underset{383K}{H_2O(g)}$$

$$\Delta S_a = \frac{\Delta H_{fusion}}{273} = \frac{334}{273} = 1.22$$

$$\Delta S_b = 4.2 \ln\left(\frac{373}{273}\right) = 1.31$$

$$\Delta S_c = \frac{\Delta H_{vapourisation}}{373} = \frac{2491}{373} = 6.67$$

$$\Delta S_a = 2 \ln\left(\frac{383}{373}\right) = 0.05$$

$$\Delta S_{Total} = \Delta S_a + \Delta S_b + \Delta S_c + \Delta S_d = 1.22 + 1.31 + 6.67 + 0.05 \simeq 9.26\,kJ\ kg^{-1}K^{-1}$$

15.(D) $V_i = 5m^3$; $V_f = 1m^3$

$P_{ext} = 4\,N/m^2$

Isothermal $\longrightarrow \Delta U = 0$

$q + W = 0$

$$q = -W = -\left[-\int P_{ext} dV\right] = \int P_{ext} dV = P_{ext}\int dV = P_{ext}\Delta V = 4[1-5] = 4\times(-4) = -16\,J$$

Heat lost by the system = 16J

$16 = nC\Delta T$

$$16 = (1)(24)\Delta T \quad \Rightarrow \quad \Delta T = \frac{16}{24} = \frac{2}{3}$$