Nishant Jindal

Chapter	Task	Date
Thermodynamics	Notes	Monday, 1 January 2024
	Jee Main Selected PYQS-2	Tuesday, 2 January 2024
	Class	Wednesday, 3 January 2024
Thermochemistry	Notes + Jee Main Selected PYQS-2	Thursday, 4 January 2024
Mole concept	Notes + Jee Main Selected PYQS-2	Friday, 5 January 2024
Concentration Terms	Notes + Jee Main Selected PYQS-2	Saturday, 6 January 2024
		Sunday, 7 January 2024
Chemical Kinetics	Notes	Monday, 8 January 2024
	Jee Main Selected PYQS-2	Tuesday, 9 January 2024
	Class	Wednesday, 10 January 2024
Chemical Equilibrium	Notes + Jee Main Selected PYQS-2	Thursday, 11 January 2024
Ionic Equilibrium	Notes	Friday, 12 January 2024
	Jee Main Selected PYQS-2	Saturday, 13 January 2024
		Sunday, 14 January 2024
Redox Reactions	Notes + Jee Main Selected PYQS-2	Monday, 15 January 2024
Electrochemistry	Notes	Tuesday, 16 January 2024
	Class	Wednesday, 17 January 2024
	Jee Main Selected PYQS-2	Thursday, 18 January 2024
Liquid Solution	Notes + Jee Main Selected PYQS-2	Friday, 19 January 2024
Atomic structure	Notes + Jee Main Selected PYQS-2	Saturday, 20 January 2024
		Sunday, 21 January 2024

13.5

Score 0

Score +1

Score −1

akk 7007

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$$\Delta U = q + W$$

$$\Rightarrow \Delta U = nC_v dT + \left(\frac{\partial U}{\partial V}\right)_T dV$$

$$\rightarrow \begin{cases} q = nC_v \Delta T \\ q = nC_p \Delta T \end{cases}$$

$$W = -\int P_{ext}\, dV$$

$$\Delta H = nC_p dT$$

$$\begin{aligned} \Delta H &= \Delta U + (P_2V_2 - P_1V_1) \\ &= \text{''} + nR\Delta T \\ &= \text{''} + \Delta n_g RT \end{aligned}$$

<u>Isothermal</u>

$\Delta U = 0$ $\quad \Delta H = 0$

$$W_{rev} = -nRT \ln P_1/P_2$$

$$Q = -W$$

$$W_{irr} = -P_{ext}(V_2 - V_1)$$

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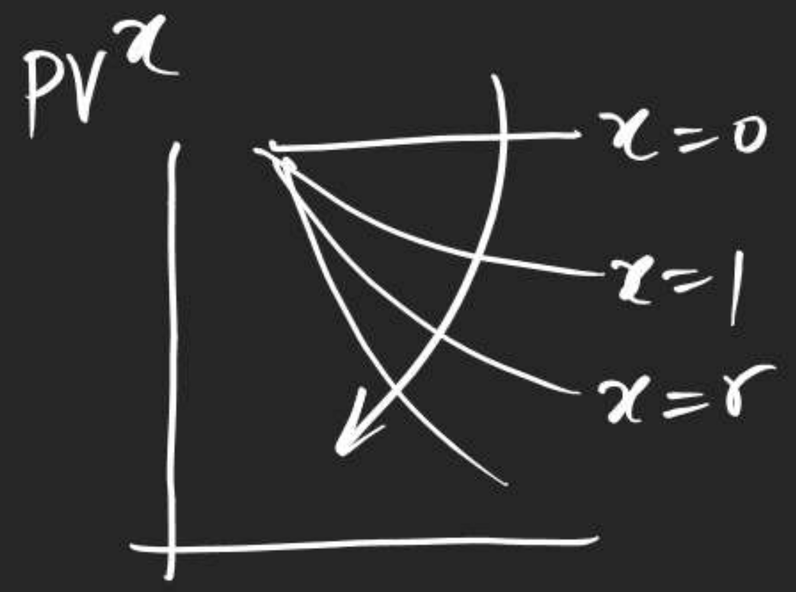
Isochoric

$$Q = \Delta U = nC_v\Delta T$$

$$W = 0$$

$$\Delta H = nC_p\Delta T$$



Adiabatic

exp $\quad T\downarrow \quad P\downarrow$

Comp $\quad T\uparrow \quad P\uparrow$

$$Q = 0 \qquad W = \Delta U = nC_v\Delta T$$

$\rightarrow$

$$PV^{\gamma} = \text{Const}$$

$$TV^{\gamma-1} = C$$

$$P^{1-\gamma}T^{\gamma} = C$$

Rev

$$nC_v(T_2 - T_1) = -P_{ext}\left(\frac{nRT_2}{P_2} - \frac{nRT_1}{P_1}\right)$$

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$$C = C_V - \frac{R}{x-1}$$

$$W = \frac{P_2V_2 - P_1V_1}{x-1} = \frac{nR(T_2 - T_1)}{x-1}$$

→ <u>Carnot Cycle</u> $= \frac{Q_2 + Q_1}{Q_2} \times 100$ ← Rev & Irrev

$\frac{T_2 - T_1}{T_2} \times 100$ ← <u>Rev</u>

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$$\oint \frac{q}{T} \le 0$$

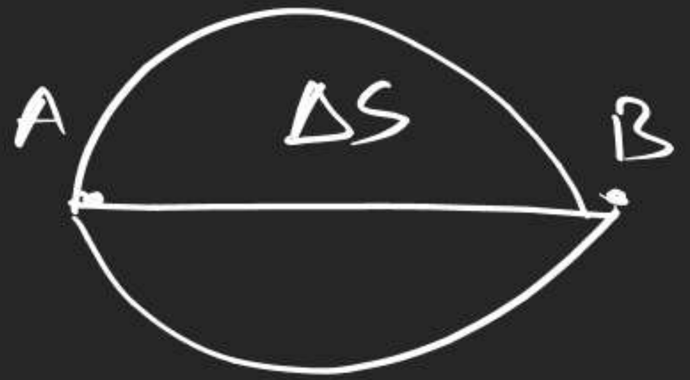
$$\underline{dS} = \frac{q_{rev}}{T}$$

$$\Rightarrow \Delta S_{sys} = nC_v \ln\frac{T_2}{T_1} + nR\ln\frac{V_2}{V_1}$$

$$\Rightarrow \Delta S_{surr} = \frac{q_{surr}}{T_{surr}}$$

$$\Delta S = \frac{\Delta H}{T}$$ at m.pt

b.pt



$2NH_3 \rightarrow N_2 + 3H_2$

$PCl_5 \rightarrow PCl_3 + Cl_2$

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$$\Delta S_r = \sum S(Pr) - \sum S(R)$$

$$(\Delta S_r)_{T_2,P_2} - (\Delta S_r)_{T_1,P_1} = (\Delta C_p)_r \ln \frac{T_2}{T_1} + \Delta n_g R \ln P_1/P_2$$

$$(\Delta H_r)_{T_2} - (\Delta H_r)_{T_1} = (\Delta C_p)_r (T_2 - T_1)$$

$$(\Delta H_r)_{P_2} = (\Delta H_r)_{P_1}$$

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$(dG)_{T,P} < 0$ feasible

> 0

$= 0$ Rev

$$\boxed{\Delta G = \Delta H - T\Delta S}$$

$dG = vdp - sdT$

at const 'T'

$dG = vdp$

$nRT \ln P_2/P_1$ $= W_{iso}$

$P_{ext}(V_2 - V_1)$

$$H_2O(l,\ 1\,atm,\ 373\,K) \xrightarrow[\Delta G_r = 0]{} H_2O(g,\ 1\,atm,\ 373\,K)$$

$$\begin{tikzcd}
H_2O(l,\ 5\,atm,\ 373\,K) \arrow[r] \arrow[d, "V(1-P)"] & H_2O(g,\ 5\,atm,\ 373\,K) \\
H_2O(l,\ 1\,atm,\ 373\,K) \arrow[r, "\Delta G = 0"'] & H_2O(g,\ 1\,atm,\ 373\,K) \arrow[u, "nRT\ln \frac{P_2}{P_1}"']
\end{tikzcd}$$

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$$-\Delta G = W_{non\text{-}pv,\,by}$$

$$\Delta G_r = \Delta G_r^\circ + RT\ln Q$$

$$\Delta G_r^\circ = -RT\ln K$$

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

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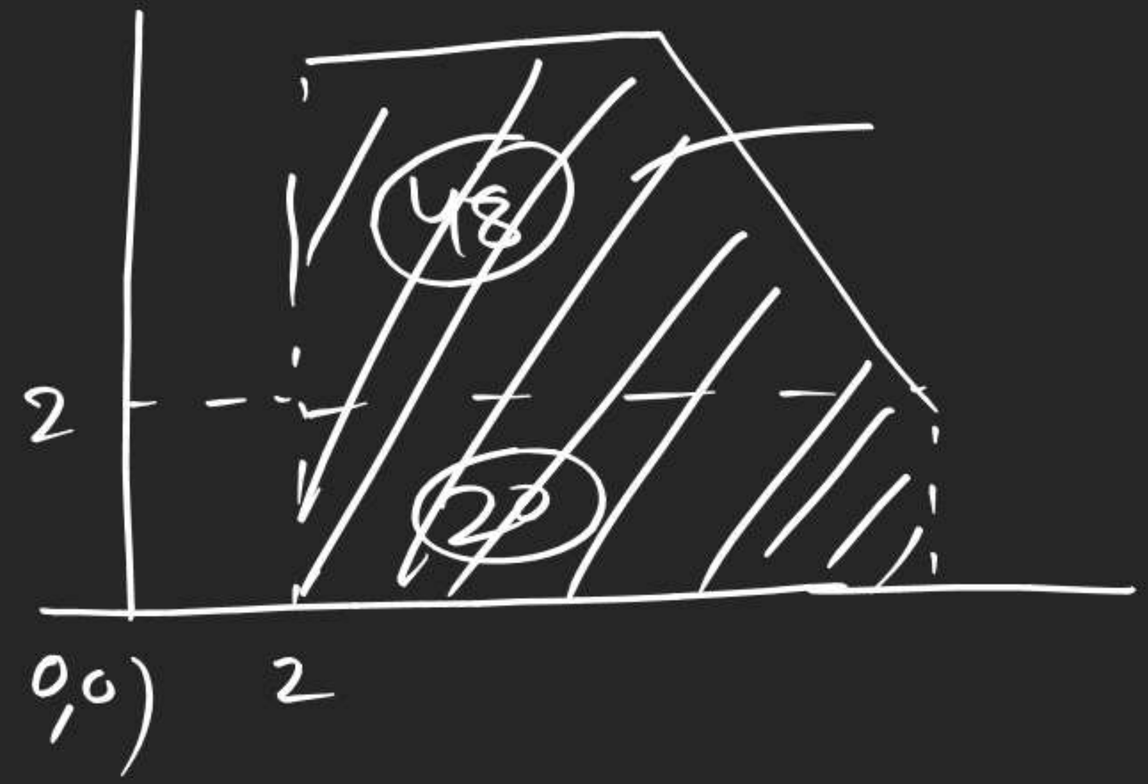
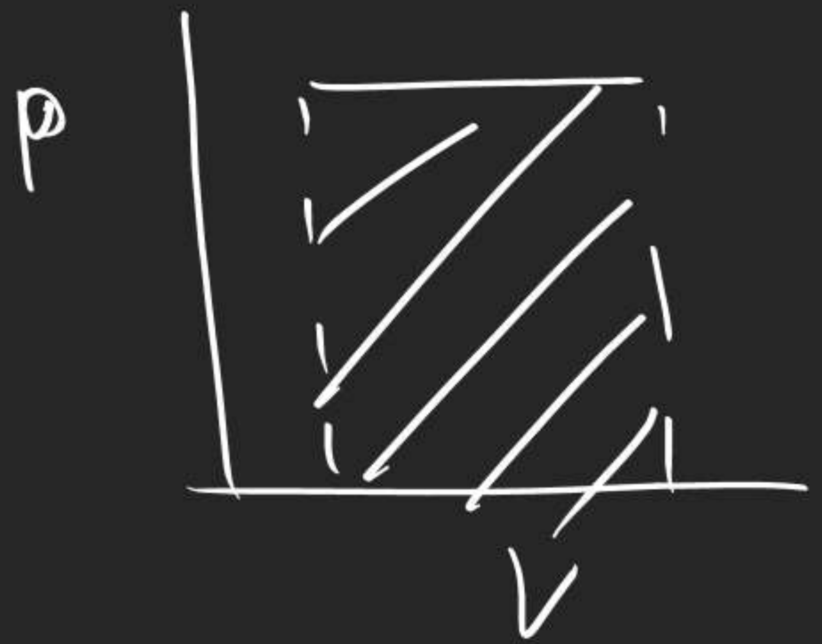
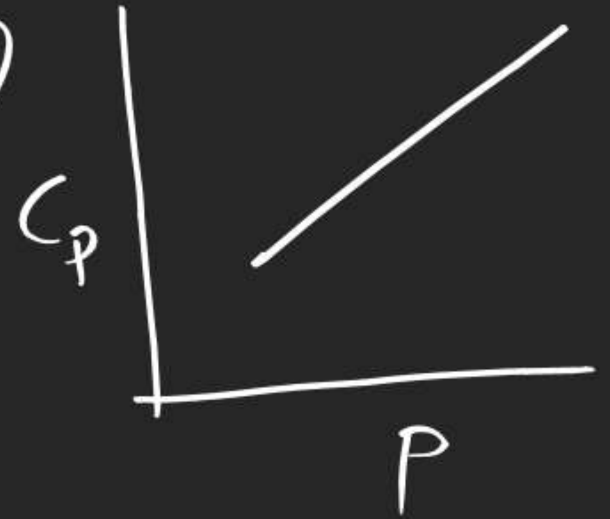
(7)





(1) as $T \uparrow$ $C \uparrow$

(A)



wrong

(4) $\Delta G = \Delta H - T\Delta S$

$-ive$ $\quad -ive \quad +ive$

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$$M + O_2 \longrightarrow MO_2$$

$$\Delta G < 0 \qquad \Delta G > 0$$

(6) $\Delta G^{\circ} = - RT \ln 10^{-14}$

(10) $\Delta G = \Delta H^{\circ} - T \Delta S^{\circ}$

$= \Delta H^{\circ} - 2T^2 = 0$

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$$2HI \longrightarrow H_2 + I_2$$

$$1 - x \qquad x/2 \qquad x/2$$

$$1 - 0.4 \qquad 0.2 \qquad 0.2$$

$$0.6$$

$$K = \frac{\cancel{0.2} \times 0.2}{\underset{3}{\cancel{0.6}} \times 0.6} = 1/9$$

$$\Delta G^\circ = -\ 2.303 \times R \times 300 \log 1/9$$

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Thermochemistry

$$\Delta H_r = \Delta H_f(Pr) - \Delta H_f(R)$$

$$= \Delta H_{comb}(R) - \Delta H_{comb}(Pr)$$

$$= BE(R) - BE(Pr)$$

$\cancel{N_2 + 3H_2 \rightarrow 2NH_3}$

$C(\text{graphite}) + O_2 \rightarrow CO_2(g)$

$\rightarrow \Delta H_{comb}$

ΔU_{comb}

ΔH atomisation

$H_2O(l) \longrightarrow 2H(g) + O(g)$

$$|Q| = \underline{\left[(ms)_{H_2O} + (ms)_{cont}\right]}\Delta T$$

$$|Q_m| = \frac{|Q|}{n}$$

$$\Delta U = -|Q_m|$$

$$\Delta H = \Delta U + \Delta n_g RT$$

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$\Delta H_{hyd} = -ive$

$$\boxed{\Delta H_{soln} = LE + \Delta H_{hydration}}$$

mostly +ive

$\Delta H_{diln} < 0$

$$\boxed{Q = mS\Delta T}$$

$Q = \underline{V} \times d \times s \times \Delta T$

$\frac{Q}{V} \propto \Delta T$