YAKEEN NEET 2.0

2026

Thermodynamics & Thermochemistry

Physical Chemistry | Lecture -4

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Topics to be covered

1. Revision of Last Class
2. Enthalpy, Heat Capacities, Poison Ratio
3. Home work from Modules, Magarmach Practice Questions

Rules to Attend Class

1. Always sit in a peaceful environment with headphone and be ready with your copy and pen.
2. Never ever attend a class from in between or don't join a live class in the middle of the chapter.
3. Make sure to revise the last class before attending the next class & always complete your Magarmach Practice Questions.
4. Never ever engage in chat whether live or recorded on the topic which is not being discussed in current class as by doing so u can be blocked by the admin team or your subscription can be cancelled.

Rules to Attend Class

5. Try to make maximum notes during the class if something is left then u can use the notes pdf after the class to complete the remaining class.
6. Always ask your doubts in doubt section to get answer from faculty. Before asking any doubt please check whether same doubt has been asked by someone or not.


There is one big flaw in your Preparation that's name is Backlog ? What do we say to Backlog ?
NOT TODAY !!!

MEDICS Test

↓

Some basic Concepts of Chem

+

Redox reactions

→ Tough → Saturday

Revision of Last Class

$q = ms\Delta T$

$w = -P_{ext}\Delta V$

rev $P_{ext} \approx P_{int}$

$w = -P\Delta V$ ✓

$= -nR\Delta T$

$= -\Delta n_g RT$

$w = -P_{ext}\Delta V$

Enthalpy (H)

$q_p = \Delta H$

$\Delta U = \Delta H + w$

$\Delta H = \Delta U - w$ or $nR\Delta T$

$\Delta H = \Delta U + P\Delta V$ or $\Delta n_g RT$

Enthalpy (Energy) Change

- Exothermic reactions
  $-\Delta H$

- Endothermic reactions
  $+\Delta H$

First Law of Thermodynamics

$\Delta U = q + w$

Isochoric $\Rightarrow w = 0$ $\Delta U = q_v$

Adiabatic $\Rightarrow q = 0$ $\Delta U = w$

Cyclic or Isothermal $\Delta T = 0 \Rightarrow \Delta U = 0$

$q = -w$

Isobaric process

$\Delta U = q_p + w$

Enthalpy (H)

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① $\Delta H = \Delta U + P\Delta V$ or $\Delta n_g RT$ or $nR\Delta T$

② unit Joule → extensive Prop
↳ J/mol → intensive ,,

③ Stt fn

④ 2 Types of rxns

ⓐ exothermic rxn = Heat released ∴ T↑

$A\!\sim\!B + C\!\sim\!D \rightarrow A\text{-}C + B\text{-}D$ $\quad \Delta H = (-)ve$

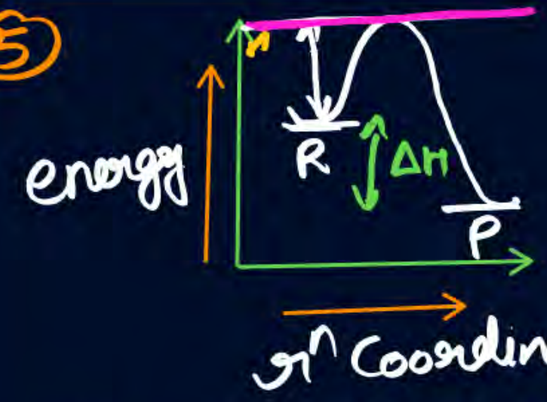
ⓑ endothermic rxn = Heat absorb ∴ T↓

$A\!\sim\!B + C\!\sim\!D \rightarrow A\text{-}C + B\text{-}D$

A B + C D

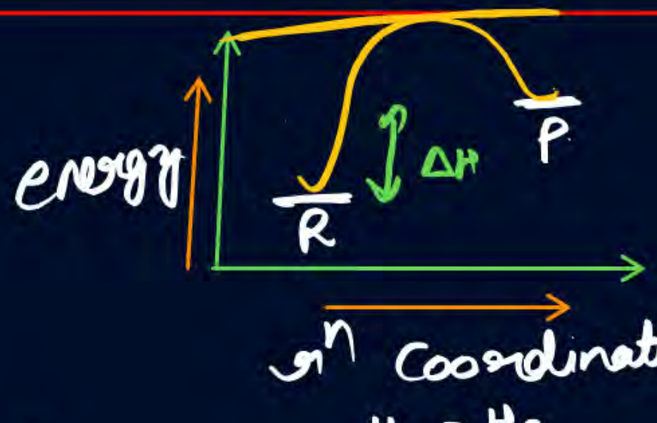
#MIT

⑤



$\Delta H = H_P - H_R$ $(H_P < H_R)$

$= (-)ve$ ⇒ exothermic



$\Delta H = 0$

$H_P > H_R$

$\therefore \Delta H = (+)ve$ ⇒ endothermic

⑥ $\underset{(q_p)}{\Delta H} = \underset{(q_v)}{\Delta U} + \Delta n_g RT$

$\Delta n_g = n_{P(g)} - n_{R(g)}$

If $n_{P(g)} > n_{R(g)} \Rightarrow \Delta H > \Delta U$

If $n_{P(g)} < n_{R(g)} \Rightarrow \Delta H < \Delta U$

If $n_{P(g)} = n_{R(g)} \Rightarrow \Delta H = \Delta U$

QUESTION – (AIIMS 2016)

Choose the reaction in which ΔH is not equal to ΔU?

A) $C_{(graphite)} + O_2(g) \rightarrow CO_2(g)$

B) $C_2H_4(g) + H_2(g) \rightarrow C_2H_6(g)$ ⟶ $n_R(g) = 2 \Rightarrow \Delta n_g = 2 - 1 = 0$, $n_P(g) = 1$, $\Delta H \neq \Delta U$

C) $2C_{(graphite)} + H_2(g) \rightarrow C_2H_2(g)$

D) $H_2(g) + I_2(g) \rightarrow 2HI(g)$

QUESTION – (NEET 2023)

Which amongst the following options is the correct relation between change in enthalpy and change in internal energy?

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

(A) $\Delta H + \Delta U = \Delta nR$

(B) $\Delta H = \Delta U - \Delta n_g RT$

(C) $\Delta H = \Delta U + \Delta n_g RT$

(D) $\Delta H - \Delta U = -\Delta nRT$

QUESTION – (AIIMS 2007)

Calculate change in internal energy if $\Delta H = -92.2$ kJ, $P = 40$ atm and $\Delta V = -1$ L

(A) -42 kJ

(B) -88 kJ

(C) $+88$ kJ

(D) $+42$ kJ

$\Delta H = -92.2$ KJ

$= -92.2 \times 1000 = -92200$ J

$1 \text{ latm} \approx 101.3$ J

$\Delta H = \Delta U + P\Delta V$

$-92200 = \Delta U + (40 \times -1 \times 101.3)$

$-92200 = \Delta U - 4052$

$\Delta U = \frac{-92200 + 4052}{1000} \approx -88$ KJ

QUESTION – (AIIMS 2006)

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

$-92380 + 2 \times \frac{25}{3} \times 300.00$

$1\,KJ = 1000\,J$

$R = \frac{25}{3}\,JK^{-1}mol^{-1}$

$\Delta n_g = 2 - 4 = -2$

The enthalpy change (ΔH) for the reaction, $N_2(g) + 3H_2(g) \rightarrow 2NH_3(g)$ is –92.38 kJ at 298 K. The internal energy change ΔU at 298 K is:

(A) – 92.38 kJ

(B) – 87.42 kJ

(C) 97.34 kJ

(D) – 89.9 kJ

$\Delta H = -92.38\,KJ = -92.38 \times 1000 = -92380\,J$

$\Delta n_g = 2 - 4 = -2$

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

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

$= -92380 - \left(-2 \times \frac{25}{3} \times 298\right)$

$= -87.42\,KJ$

$\Delta H = -92.38\,KJ$

$= -92.38 \times 1000$

$= -92380\,J$

$T = 298\,K$

$\Delta U = ?$

QUESTION – (AIIMS 2018, 2014)

$\Delta ng = 4 - 2 = +2$

Assertion: For a reaction $2NH_3(g) \rightarrow N_2(g) + 3H_2(g)$; $\Delta H > \Delta E$

Reason: Enthalpy change is always greater than internal energy change. for any gas

(A) If both Assertion and Reason are correct and the Reason is the correct explanation of Assertion.

(B) If both Assertion and Reason are correct but Reason is not the correct explanation of Assertion.

(C) If Assertion is correct but Reason is incorrect.

(D) If both the Assertion and Reason are incorrect.

Heat req. to raise temp. by 1°C.

Heat Capacity (C)

$C = \frac{\delta q}{dT}$ ($dT = 1^\circ C \Rightarrow \delta q = C$)

$dT = 1^\circ C$ → $dT = 1^\circ C$

$dT = 1^\circ C$ Substance. → C

" total system

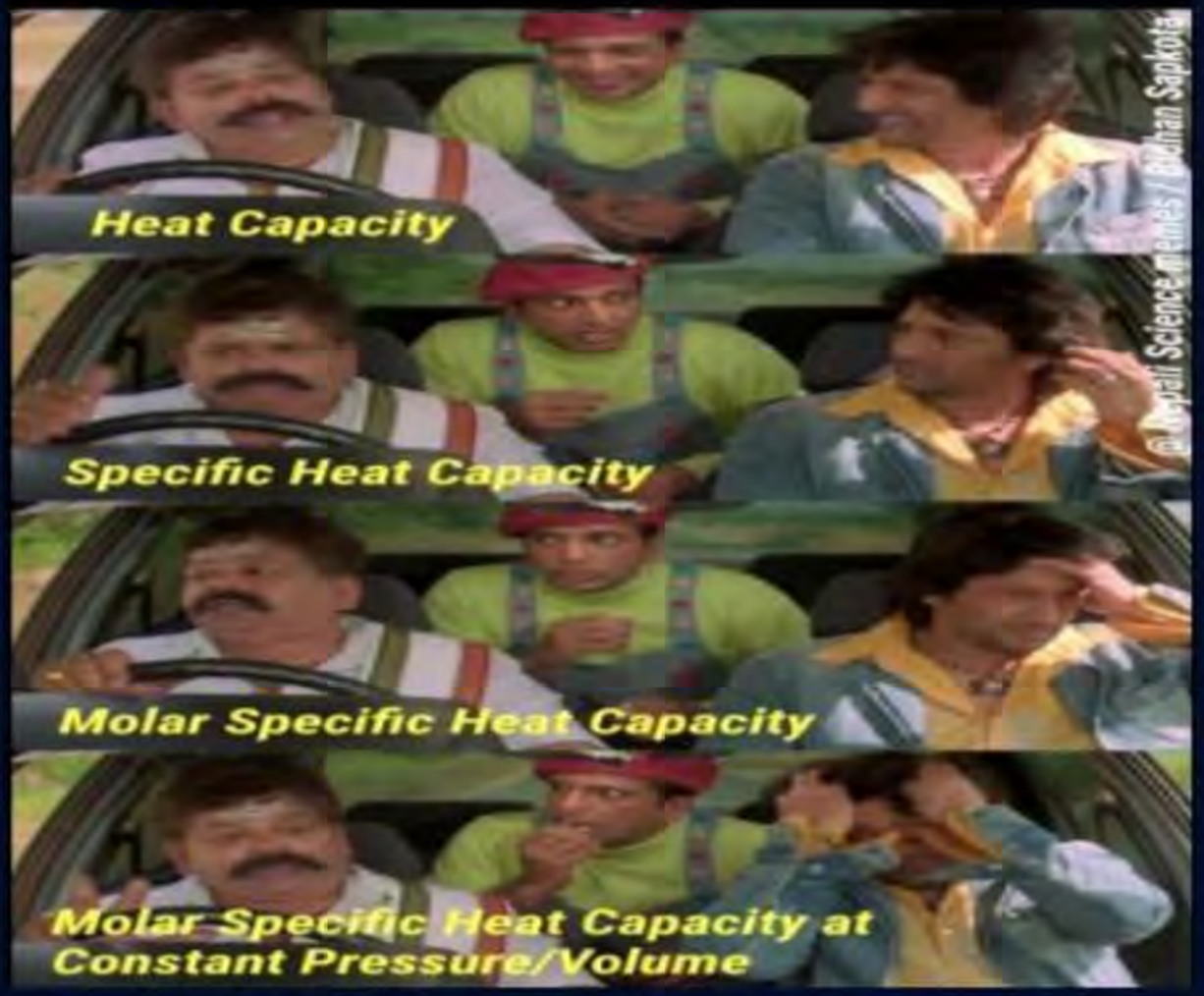
" 1 g → s or $C_s = \frac{\delta q}{dT}$ → C_{sp}

" 1 mole → $C_m = \frac{\delta q}{dT}$

" 1 mole → $C_{p,m} = \left(\frac{\delta q}{dT}\right)_p$, $C_{v,m} = \left(\frac{\delta q}{dT}\right)_v$

$C_p = \left(\frac{\delta q}{dT}\right)_p$

$C_v = \left(\frac{\delta q}{dT}\right)_v$



$C = n C_m$

$C_p = n C_{p,m}$

$C_v = n C_{v,m}$

n = moles

$H = U + PV$

$dH = dU + PdV + VdP$

$C_v = \left(\frac{\delta q}{dT}\right)_V$

$C_v = \frac{dU}{dT}$

$n C_{v,m} = \frac{dU}{dT}$

$dU = n C_{v,m} dT$

$\Delta U = n C_{v,m} \Delta T$

$dU = \delta q + \delta w \quad \delta w = -PdV$

$\delta q = dU - \delta w \quad dH = dU + PdV$

$\left(\frac{\delta q}{dT}\right)_V = \left(\frac{dU}{dT}\right)_V + P\left(\frac{dV}{dT}\right)_V \quad \frac{dV}{dT} = 0$

$C_p = \left(\frac{\delta q}{dT}\right)_P$

$C_p = \frac{dH}{dT}$

$n C_{p,m} = \frac{dH}{dT}$

$\delta q = dU + PdV$

$\left(\frac{\delta q}{dT}\right)_P = \left(\frac{dH}{dT}\right)_P$

$dH = n C_{p,m} dT$

$\Delta H = n C_{p,m} \Delta T$

MIT

① $\Delta H = n C_{p,m} \Delta T$

② $\Delta U = n C_{v,m} \Delta T$

$\Delta U = q_v$

V

QUESTION

Q Why C_P is greater than C_V?

Ans

(21)

5-6 am → 1 Class finish backlog

→ Revise most difficult subject → 1.5 hr – 2 hrs

8.45 am to 3 pm

3 pm → $\frac{1}{2}$ hr rest

3.45 pm → Revise 3 classes within 3-4 hrs → 5 min

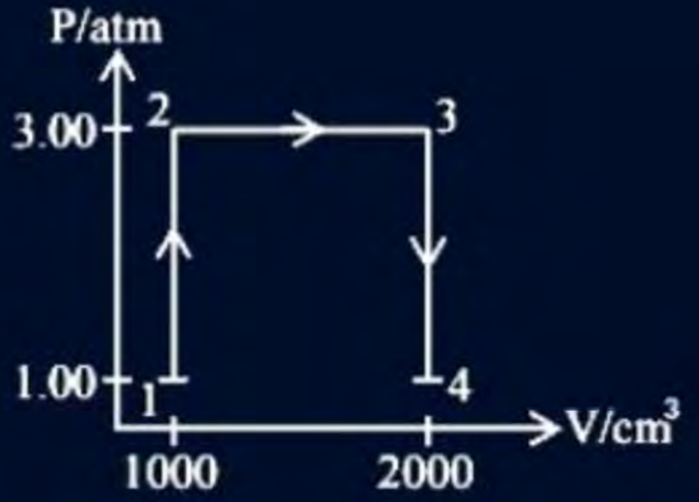
8 pm → dinner 8.30 pm

8.30 pm to 11 pm → Question practice, Previous topics Revise, Test

Magarmach Practice Questions (MPQ)

QUESTION – [NCERT: PL-142 | NV, JEE Mains April 3, 2025 (II)]

A perfect gas (0.1 mol) having $\bar{C}_v = 1.50R$ (independent of temperature) undergoes the above transformation from point 1 to point 4. If each step is reversible, the total work done (w) while going from point 1 to point 4 is (–) ___ J (nearest integer) [Given : $R = 0.082$ L atm K^{-1} mol^{-1}]



QUESTION – [NCERT: PL-138 | JEE Mains April 3, 2025 (I)]

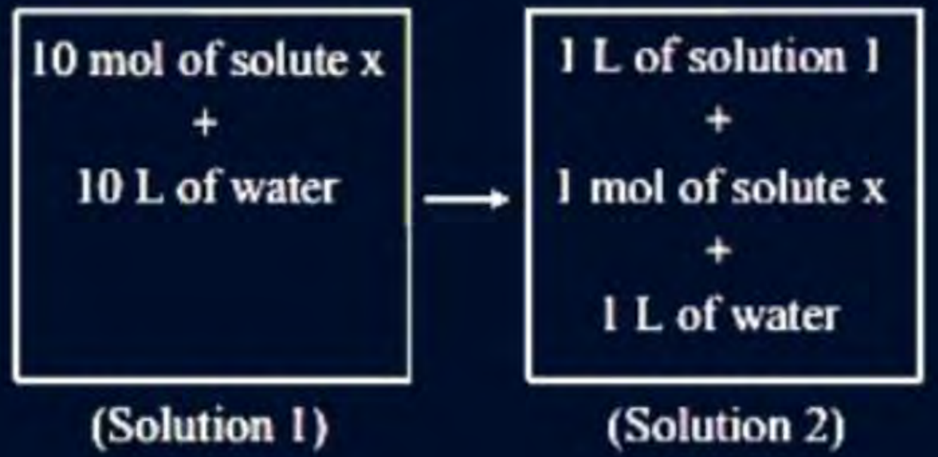
Which of the following properties will change when system containing solution 1 will become solution 2?

(A) Molar heat capacity

(B) Density

(C) Concentration

(D) Gibbs free energy



QUESTION – [NCERT: PL-143 | JEE Mains Jan. 29, 2025 (1)]

500 J of energy is transferred as heat to 0.5 mol of Argon gas at 298 K and 1.00 atm. The final temperature and the change in internal energy respectively are : Given: $R = 8.3\ JK^{-1}\ mol^{-1}$

A. 348 K and 300 J

B. 378 K and 300 J

C. 368 K and 500 J

D. 378 K and 500 J

QUESTION – [NCERT : PL-143 | JEE Mains Jan. 22, 2025 (1)]

A liquid when kept inside a thermally insulated closed vessel at 25°C was mechanically stirred from outside. What will be the correct option for the following thermodynamic parameters ?

A $\Delta U > 0, q = 0, w > 0$

B $\Delta U = 0, q = 0, w = 0$

C $\Delta U < 0, q = 0, w > 0$

D $\Delta U = 0, q < 0, w > 0$

THANK YOU