

YAKEEN NEET 2.0

2026

Thermodynamics & Thermochemistry

Physical Chemistry

Lecture -12

By- Amit Mahajan Sir





Topics to be covered

- 1 Revision of Last Class
- 2 Entropy numericals & gibbs free energy
- 3 Magarmach Practice Questions, Home work from Modules,
↓
NEET PYQ



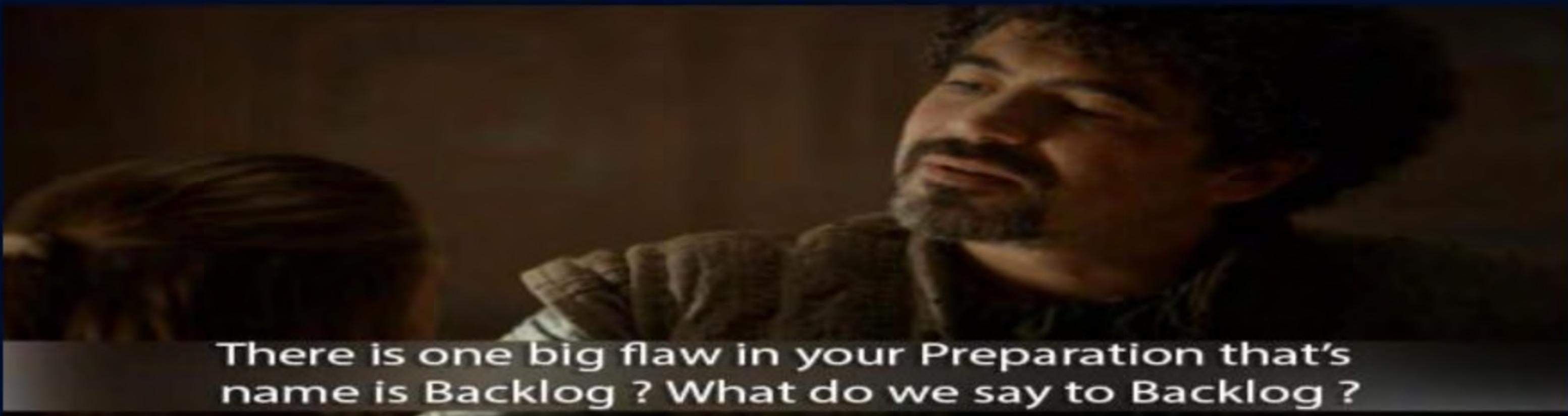
Rules to Attend Class

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

Q1 An aq. sol has urea & glucose in mass ratio 3:1
 ↓
 60g 180g

Let $w_u = 540\text{ g}$

$w_g = \frac{180\text{ g}}{1800\text{ g}}$

$w_w = \underline{\underline{1800\text{ g}}}$

If mass ratio of water & glucose is 10:1

then $x_{\text{glucose}} = \frac{1}{1+100+9} = \frac{1}{110}$

$$\frac{w_u}{w_g} = \frac{3}{1}$$

$$\frac{w_w}{w_g} = \frac{10}{1}$$

~~(a) $\frac{1}{110}$~~

(b) $\frac{100}{110}$

(c) $\frac{9}{110}$

(d) $\frac{3}{110}$

$$n_g = \frac{180}{180} = 1$$

$$n_w = \frac{1800}{18} = 100$$

$$n_u = \frac{540}{60} = 9$$

Q2 10ml $\text{H}_2(\text{g})$ requires 25ml air for complete combustion.

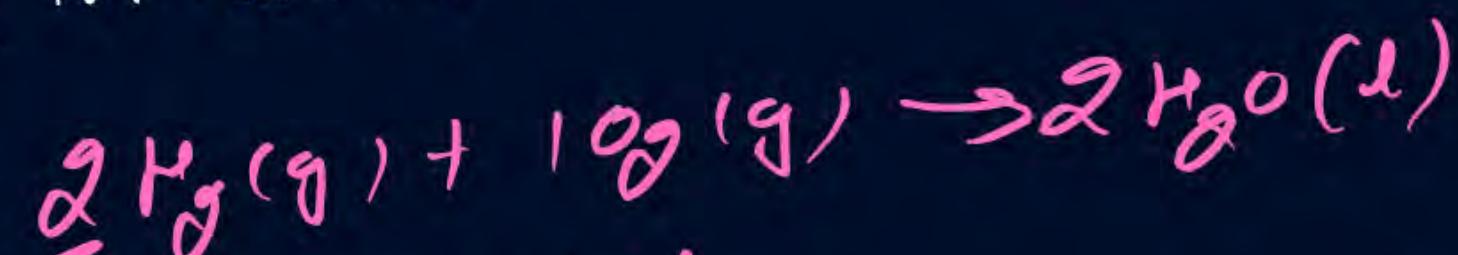
The volume % of N_2 in air is

(a) 20%

~~(b)~~ 80%

(c) 79%

(d) 5%



$$2 \text{ml} \rightarrow 1 \text{ml}$$

$$10 \text{ ml} \rightarrow 5 \text{ ml}$$

$$\text{air Vol.} = 25 \text{ ml}$$

$$V_{\text{O}_2} = 5 \text{ ml}$$

$$V_{\text{N}_2} = 20 \text{ ml}$$

$$\text{Vol. \% } \text{N}_2 = \frac{20}{25} \times 100 = 80\%$$

Q3 What Vol. of 0.8M AlCl_3 mixed with $50\text{ml of } 0.2\text{M CaCl}_2$

$\frac{x \text{ ml}}{\text{to get } 30\text{l}}$ in which $\underline{[Cl]} = 0.6\text{M}$

$$x \times 0.8 \times 3 + 50 \times 0.2 \times 2 = (50+x) \times 0.6 \times 1$$

a 5.56ml

b 100ml

c 50ml

d 4.89ml

$$\underline{2.4x} + 20 = 30 + \underline{0.6x}$$

$$1.8x = 30 - 20 = 10$$

$$x = \frac{10}{1.8} = \frac{100}{18} = \underline{\underline{5.55\text{ ml}}}$$

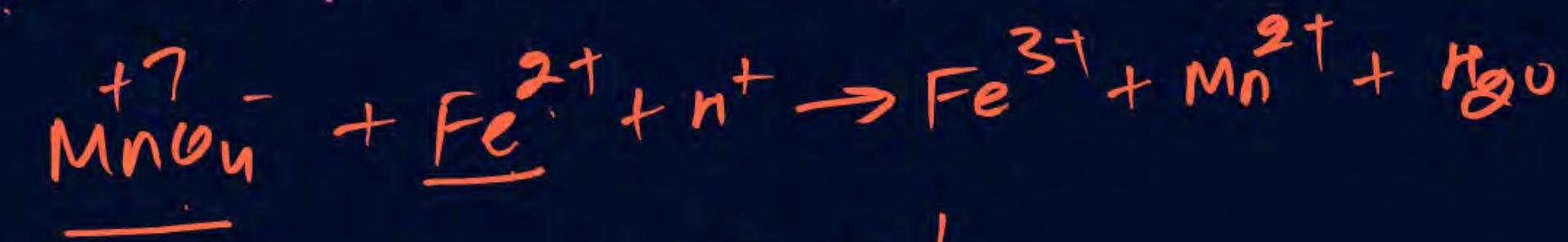
^{Q4} V_1 ml of Permanganate sol' of molarity M_1 , react exactly with V_2 ml of Ferrous sulphate solution of molarity M_2 then.

(a) $M_1 V_1 = M_2 V_2$

~~(b)~~ $5M_1 V_1 = M_2 V_2$

(c) $M_1 V_1 = 5M_2 V_2$

(d) None of these

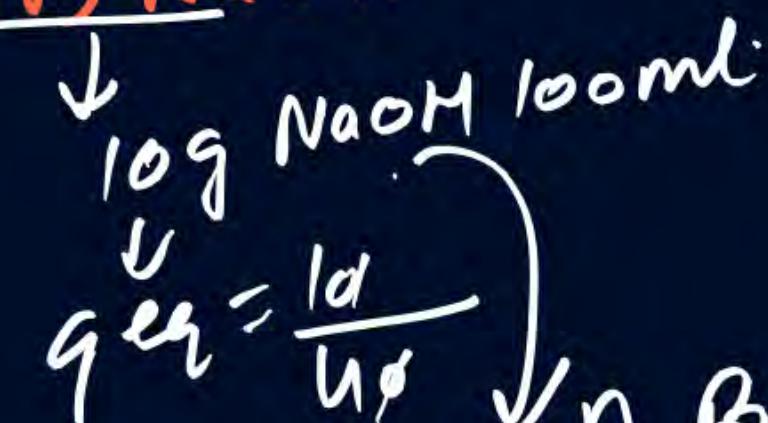
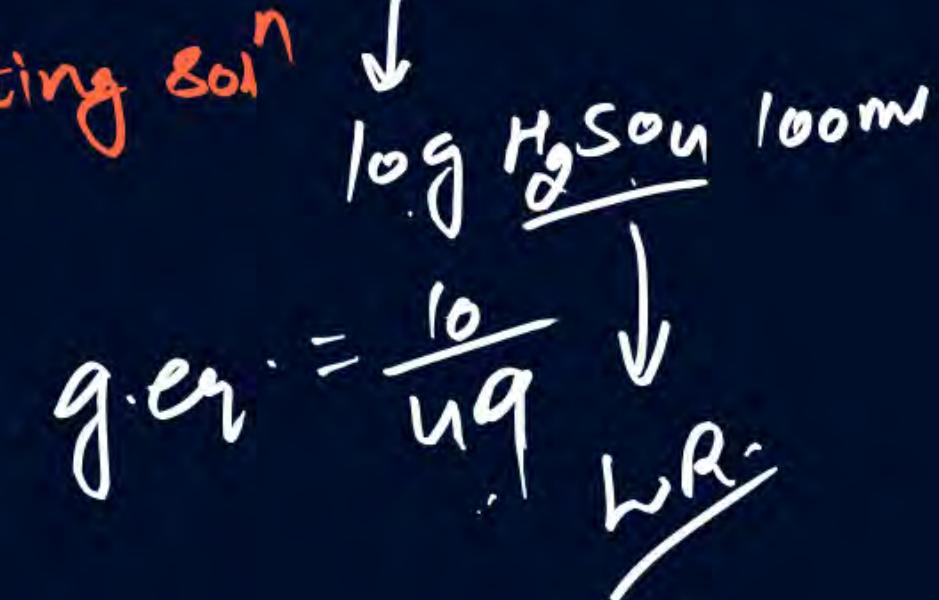


$$V_1 \times M_1 \times 5 = V_2 \times M_2 \times 1$$

Q5 eq. vol. of 10% (w/v) HgSO₄ + 10% (w/v) NaOH

Nature of resulting solⁿ

- (a) neutral
- (b) acidic
- (c) basic
- (d) unpredictable



In Basic
sol left
as NaOH is left



Revision of Last Class

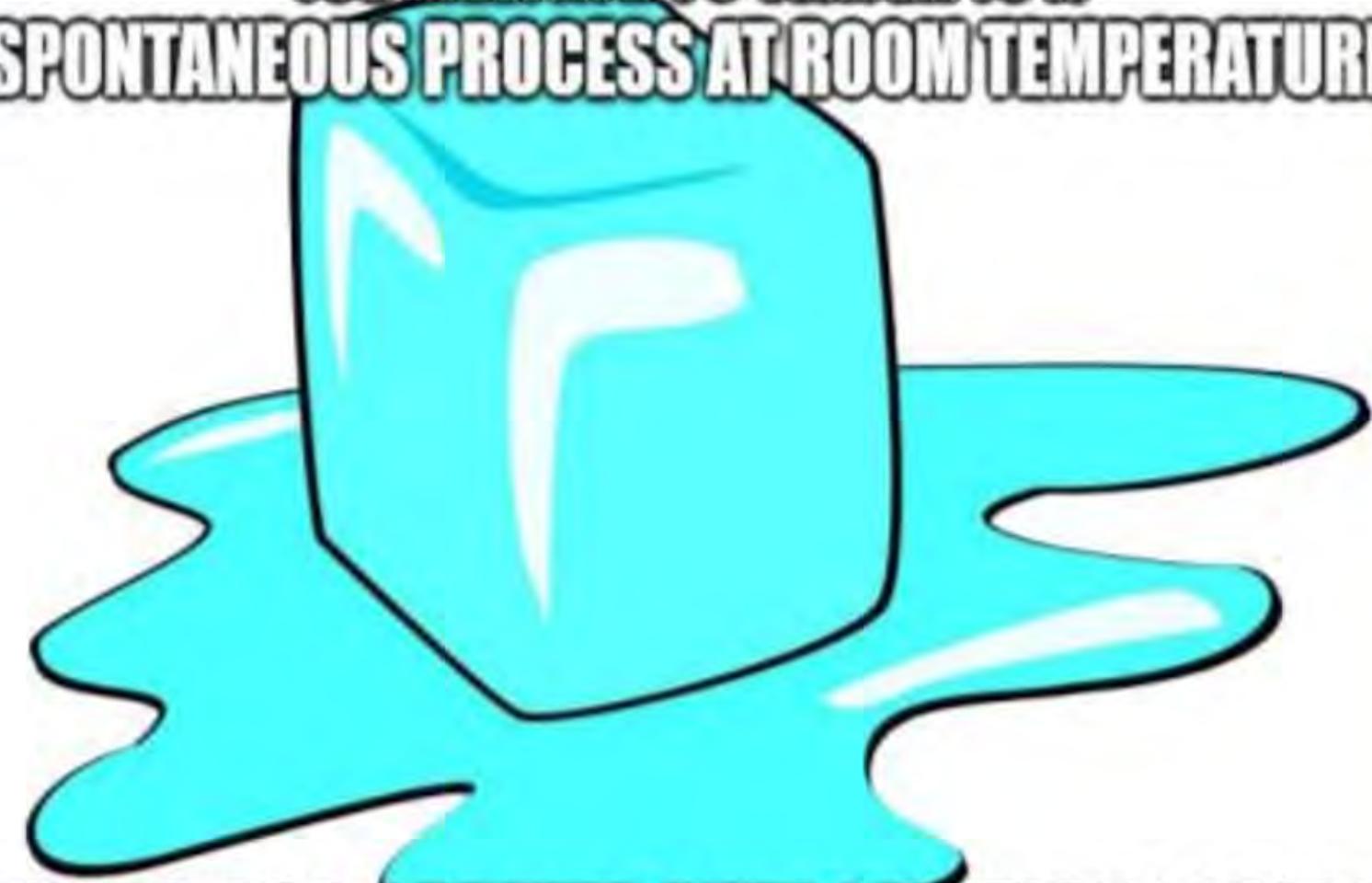
$$\frac{S \uparrow}{S_{\text{gas}} > S_{\text{liquid}} > S_{\text{solid}}}$$

$$\Delta S = \frac{q_{\text{rev. iso}}}{T}$$

$$\alpha A \rightarrow \gamma B$$

$$\Delta S = \sum S_p - \sum S_R$$

ICE MELTING TO WATER IS A SPONTANEOUS PROCESS AT ROOM TEMPERATURE



LIQUID HAS GREATER ENTROPY THAN SOLIDS!

$$dS = \frac{(C_V)_{\text{v}}}{T} dT$$

$$\left. \begin{aligned} dS &= \frac{dU}{T} \\ dS &= n C_V m \int_{T_1}^{T_2} \frac{dT}{T} \end{aligned} \right\}$$

$$\Delta S = n C_V m \ln \frac{T_2}{T_1}$$



Entropy change in various processes

$\ln \frac{V_2}{V_1} = 2.303 \log_{10}$
↓
loge

MIT

① Isothermal Rev. exp.

$$\Delta S = \frac{q_{\text{rev. iso. exp.}}}{T} = nR \ln\left(\frac{V_2}{V_1} \text{ or } \frac{P_1}{P_2}\right)$$

② Adiabatic rev. exp.

expansion $S \uparrow$ but due to $T \downarrow$, $S \downarrow$

both changes are equal & opposite \therefore total entropy change 0

③ Isoobaric expansion.

$$\Delta S = nC_{p,m} \ln \frac{T_2}{T_1}$$

④ Isochoric process:

$$\Delta S = nC_{v,m} \ln \frac{T_2}{T_1}$$

3 & 4 can be used in heating or cooling.

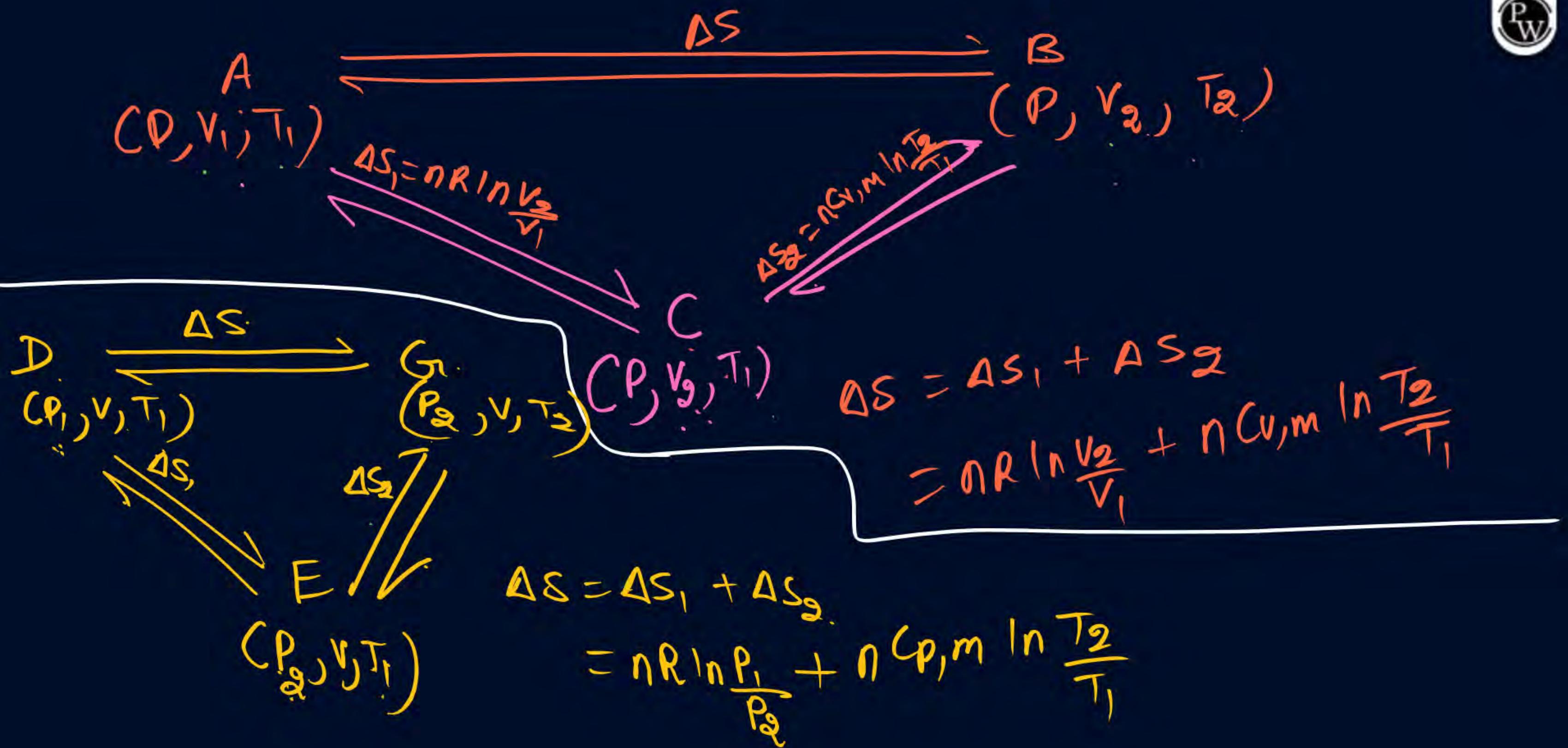
exp. ↑ adi. exp.
ST $T \downarrow$ $S \downarrow$

SdT

$$dS = \frac{(S_V)P}{T}$$

$$\int_{S_1}^{S_2} dS = \frac{dH}{T} = \frac{nC_p m}{T} \int_{T_1}^{T_2} dT$$

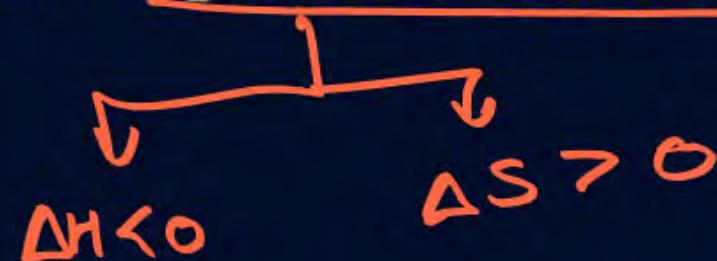
$$\Delta S = nC_p m \ln \frac{T_2}{T_1}$$



QUESTION – (NEET 2016 - I)

The correct thermodynamic conditions for the spontaneous reaction at all temperatures is:

- A $\Delta H < 0$ and $\Delta S < 0$
- B $\Delta H < 0$ and $\Delta S = 0$
- C $\Delta H > 0$ and $\Delta S < 0$
- D $\Delta H < 0$ and $\Delta S > 0$



$$\Delta S > 0$$

QUESTION – (AIPMT 2012)

The enthalpy of fusion of water is 1.435 kcal/mol. The molar entropy change for the melting of ice at 0°C is:

- A 10.52 cal/(mol K)
- B 21.04 cal/(mol K)
- C 5.260 cal/(mol K)
- D 0.526 cal/(mol K)

$$\Delta S_{\text{Fusion}} = \frac{\Delta H_{\text{Fusion}}}{T_m} = \frac{1435}{273} = 5.26 \text{ cal K}^{-1} \text{ mol}^{-1}$$

QUESTION

Consider following statements :

- I. Molar entropy of a substance follows the order.
 $(S)_{\text{solid}} < (S)_{\text{liquid}} < (S)_{\text{gas}}$
- II. Entropy increases when $\text{O}_2(\text{g})$ changes to $2\text{O}(\text{g})$ atoms
 $\text{O}_2(\text{g}) \longrightarrow 2\text{O}(\text{g})$
- III. Molar entropy of a substance is zero at absolute zero.

Select the correct statement(s).

A I, II

B I, III

C II, III

D I, II, III

QUESTION – (NEET 2024)

In which of the following processes entropy increases?

- A. A liquid evaporates to vapour
- B. Temperature of a crystalline solid lowered from 130 K to 0 K.
- C. $2\text{NaHCO}_3(s) \rightarrow \text{Na}_2\text{CO}_3(s) + \text{CO}_{2(g)} + \text{H}_2\text{O}_{(g)}$ $\Delta n_g = 2 - 0 = 2$
- D. $\text{Cl}_{2(g)} \rightarrow 2\text{Cl}_{(g)}$

$$\begin{array}{l} S \propto T \\ T \downarrow S \downarrow \end{array}$$

Choose the correct answer from the options given below.

A A and C

B A, B and D

C A, C and D

D C and D

QUESTION – (NEET 2019)

In which case change in entropy is negative?

$$\Delta S = (-)ve \text{ or } S \downarrow$$

- A Evaporation of water $S \uparrow$

- B Expansion of a gas at constant temperature



- C Sublimation of solid to gas

- D $2H(g) \rightarrow H_2(g)$

QUESTION – (AIIMS 2011)

Which of the following processes takes place with decrease of entropy?

- A ~~Solid → gas~~
- B ~~sugar + water → solution~~
- C ~~$\text{NH}_3(\text{g}) + \text{HCl}(\text{g}) \rightarrow \text{NH}_4\text{Cl}(\text{s})$~~
- D ~~A(g) + B(g) → mixture~~

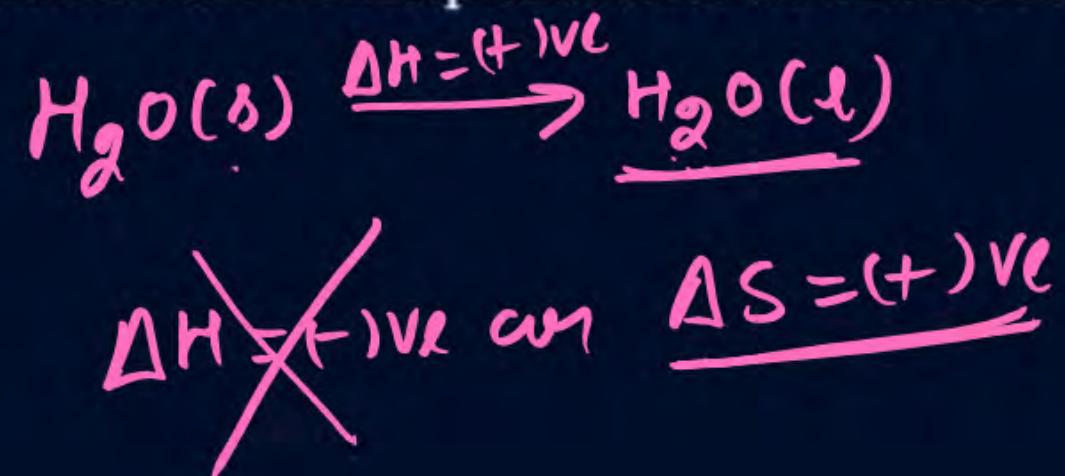
QUESTION – (AIIMS 2006)

$T = 25^\circ C = 298 K$

Assertion: Water in liquid state is more stable than ice at room temperature.

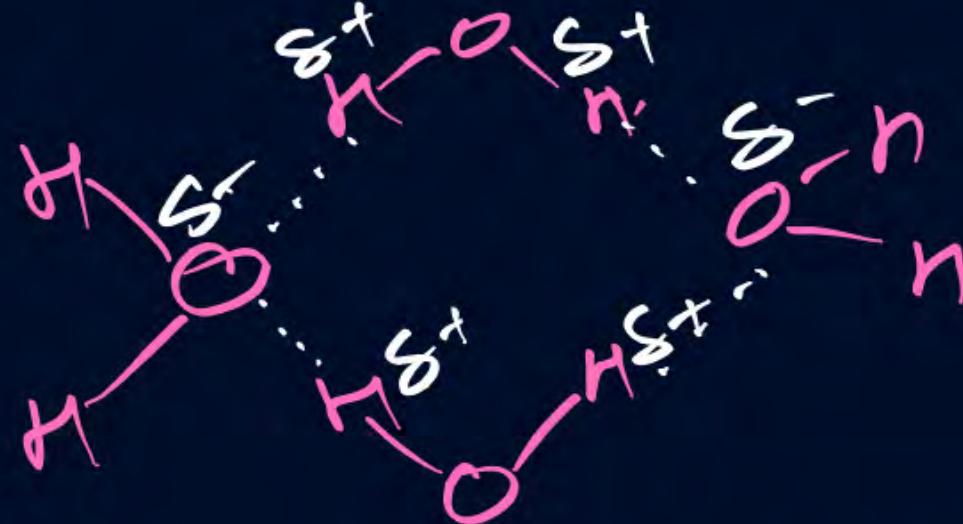
Reason: Water in liquid form has higher entropy than ice.

- A If both Assertion and Reason are correct and the Reason is a correct explanation of the Assertion.
- B If both Assertion and Reason are correct but Reason is not a correct explanation of the Assertion.
- C If the Assertion is correct but Reason is incorrect.
- D If both the Assertion and Reason are incorrect.
- E If the Assertion is incorrect but the Reason is correct.



QUESTION – (AIIMS 2000)

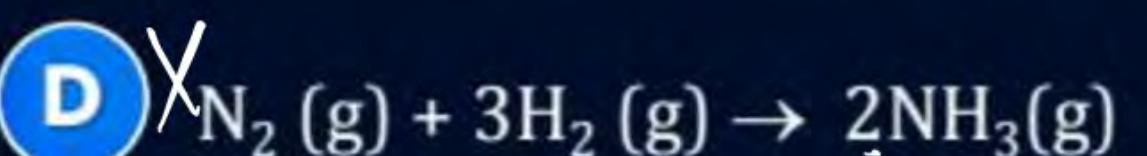
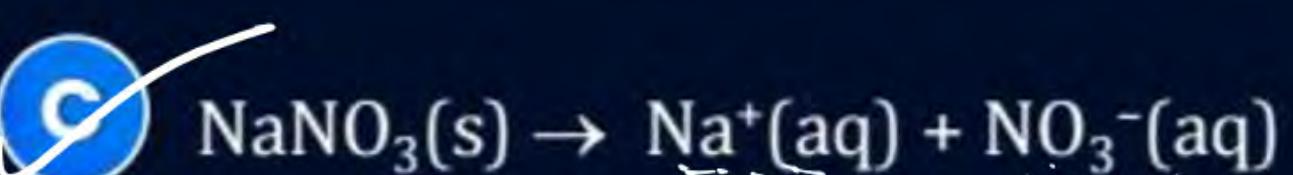
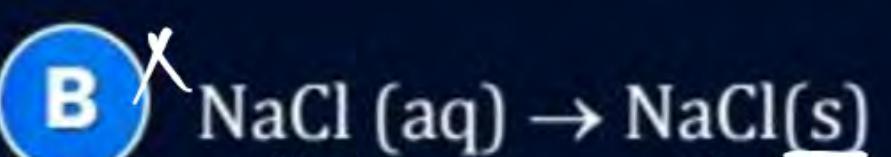
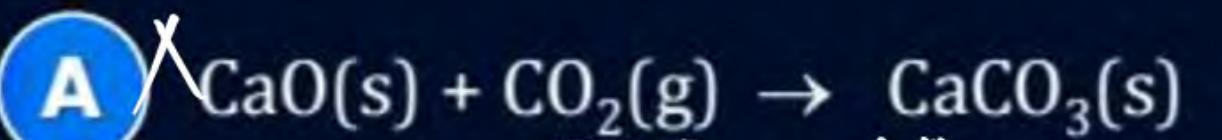
Assertion: Entropy of ice is less than water.
 Reason: Ice has cage like structure.



- A If both Assertion and Reason are correct and the Reason is a correct explanation of the Assertion.
- B If both Assertion and Reason are correct but Reason is not a correct explanation of the Assertion.
- C If the Assertion is correct but Reason is incorrect.
- D If both the Assertion and Reason are incorrect.
- E If the Assertion is incorrect but the Reason is correct.

QUESTION – (AIIMS 2003)

Which one of the following has ΔS° greater than zero?



QUESTION

5 mole of an ideal gas expands reversibly from a volume of 8 dm³ to 80 dm³ at a constant temperature 27°C. The change in entropy is:

A 41.57 JK^{-1}

$n = 5$

$V_1 = 8 \text{ L}$

Rev. $\xrightarrow{T=27^\circ\text{C}}$ exp.

B -95.73 JK^{-1}

$V_2 = 80 \text{ L}$

C 95.73 JK^{-1}

$T = 300 \text{ K}$

D -41.57 JK^{-1}

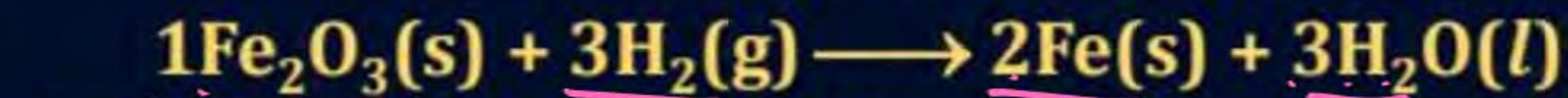
$$\Delta S = n R \ln \frac{V_2}{V_1}$$

$$= 5 \times \frac{25}{3} \times \log_{10} \frac{80}{8}$$

$$= 95.73 \text{ J K}^{-1}$$

QUESTION

Find the entropy change in the reaction:



$$\underline{S^\circ_m(\text{Fe}_2\text{O}_3(\text{s})) = 90}, \underline{S^\circ_m(\text{Fe, S}) = 30}, \underline{S^\circ_m(\text{H}_2(\text{g})) = 120}, \underline{S^\circ_m(\text{H}_2\text{O, l}) = 70 \text{ J K}^{-1} \text{ mol}^{-1}}$$

$$\begin{aligned}\Delta S &= \{2 \times 30 + 3 \times 70\} - \{1 \times 90 + 3 \times 120\} \\ &= 270 - 450 = -180 \text{ J K}^{-1}\end{aligned}$$

QUESTION

The entropy change involved in the isothermal reversible expansion of 2 moles of an ideal gas from a volume of 10 dm^3 to a volume of 100 dm^3 at 27°C is

A

$38.3 \text{ J mol}^{-1} \text{ K}^{-1}$

B

$35.8 \text{ J mol}^{-1} \text{ K}^{-1}$

C

$32.3 \text{ J mol}^{-1} \text{ K}^{-1}$

D

$42.3 \text{ J mol}^{-1} \text{ K}^{-1}$

$$N = 2, V_1 = 10 \text{ L}, V_2 = 100 \text{ L}, T = 300 \text{ K}$$

$$\Delta S = \cancel{R} \times \frac{25}{3} \times \frac{2+3}{10} \log \frac{100}{10}$$
$$= \frac{115}{3} = 38.3 \text{ J K}^{-1} \text{ mol}^{-1}$$

QUESTION

Find the change in entropy (in cal/K) of 1 mole of O₂ gas ($C_V = 5/2R$), when it is

(a) Heated from 300 K to 400 K isobarically

(b) Heated from 300 K to 400 K isochorically (given: $\ln 3 = 1.1$, $\ln 2 = 0.7$)

① $n = 1, C_{P,m} = \frac{5}{2}R + R = \frac{7}{2}R$

$$\Delta S = n C_{P,m} \ln \frac{T_2}{T_1}$$

$$= 1 \times \frac{7}{2}R \ln \frac{400}{300}$$

$$= \frac{7}{2}R \left[2 \ln(2) - \ln 3 \right]$$

$$= \frac{7}{2}R \left[2 \times 0.7 - 1.1 \right]$$

$$= \frac{7}{2}R \times 0.3 = 1.05R$$

$$= 1.05 \times 2 = 2.1 \text{ cal/K}$$

② $\Delta S = \frac{5}{2}R \times 0.3 = 0.75R$

$$= 0.75 \times 2$$

$$= 1.5 \text{ cal/K}$$

QUESTION

The entropy change when two moles of ideal monoatomic gas is heated from 200°C to 300°C reversibly and isochorically:

$$\underline{c_{V,m} = \frac{3}{2} R}, \underline{c_{P,m} = \frac{5}{2} R}$$

- A $3/2R \ln(300/200)$
- B $5/2R \ln(573/273)$
- C ~~$3R \ln(573/473)$~~
- D $3/2R \ln(573/473)$

$$\begin{aligned} n &= 2 \\ T_1 &= 473 \text{ K} \\ T_2 &= 573 \text{ K} \end{aligned}$$

$$\begin{aligned} \Delta S &= n c_{V,m} \ln \frac{T_2}{T_1} \\ &= \cancel{R} \times \frac{3}{2} R \ln \frac{573}{473} \end{aligned}$$

QUESTION

When 1 mole of ideal gas is compressed to half of its initial volume and simultaneously heated to twice its temperature, change in entropy is:

A $C_{v,m} \ln 2$

$n = 1$

$$V_1 = VL$$

$$V_2 = \frac{V}{2} L$$

$$\& T_1 = TK$$

$$T_2 = 2TK$$

$$\ln \frac{1}{2} = -\ln 2$$

$$\begin{aligned} \ln \frac{1}{2} - \ln 2 \\ 0 - \ln 2 = -\ln 2 \end{aligned}$$

B $C_{p,m} \ln 2$

$$\Delta S = -nR \ln \frac{V_2}{V_1} + nC_{v,m} \ln \frac{T_2}{T_1}$$

C $R \ln 2$

D $(C_{v,m} - R) \ln 2$

$$\Delta S = C_{v,m} \ln 2 + R \ln 2$$

$$= \ln 2(C_{v,m} + R) = C_{p,m} \ln 2$$

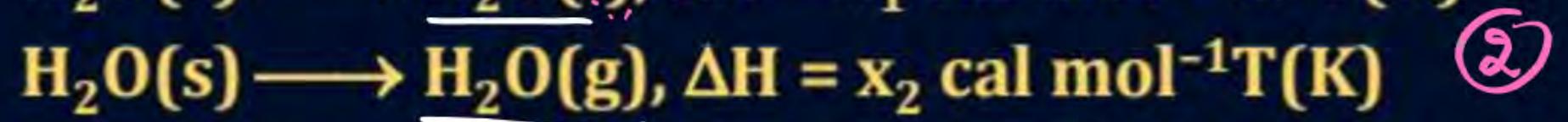
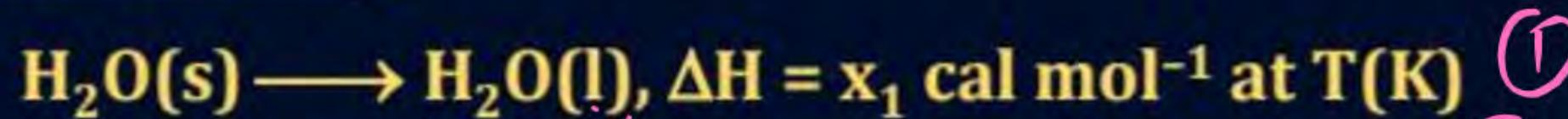
QUESTION

Entropy change of vaporisation of $\text{H}_2\text{O(l)}$ at 1 atm pressure is 26.81 cal $\text{mol}^{-1} \text{K}^{-1}$.
Thus, latent heat of vaporisation of $\text{H}_2\text{O(l)}$ is

- A 26.81 cal mol⁻¹
- B 10.0 kcal mol⁻¹
- C 10.00 cal mol⁻¹
- D 100.0 kcal mol⁻¹

$$\Delta S = 26.81 \text{ cal K}^{-1} \text{ mol}^{-1} = \frac{\Delta H_{\text{vap}}}{373}$$
$$\Delta H_{\text{vap}} = 26.81 \times 373$$
$$= 10 \text{ K} \text{ (cal mol)}^{-1}$$

QUESTION



Entropy change for $\text{H}_2\text{O}(l) \longrightarrow \text{H}_2\text{O}(g)$ is in $\text{cal mol}^{-1} \text{ K}^{-1}$

A $\left(\frac{x_1 + x_2}{T} \right)$

$$\frac{x_2 - x_1}{T}$$

B $\left(\frac{x_1 - x_2}{T} \right)$

C $\left(\frac{x_2 + x_1}{T} \right)$

D $- \left(\frac{x_1 + x_2}{T} \right) = \frac{-x_2 - x_1}{T}$

$$eq \text{ } ② - eq \text{ } ①$$



$$\Delta S = \frac{\Delta H}{T} = \frac{x_2 - x_1}{T}$$

QUESTION

1 mole of an ideal gas at 298 K is expanded isothermally and reversibly from 10 L to 100 L. Thus, entropy change is (in JK^{-1})

A 2.303×8.314

B -2.303×8.314

C 8.314

D -8.314

$$n = 1, T = 298 \text{ K}$$

$$V_1 = 10 \text{ L}, V_2 = 100 \text{ L}$$

$$\Delta S = \underline{1 \times 8.314 \times 2.303 \log \frac{100}{10}}$$

↑
T

QUESTION

Temperature of one mole of an ideal gas changes from T_1 to T_2 and simultaneously volume changes from V_1 to V_2 . Thus,

A $\Delta S = R \log \frac{V_2}{V_1} + C_p \log \frac{T_2}{T_1}$

$$\Delta S = \cancel{\Omega R \log \frac{V_2}{V_1}} + \Omega C_V m \log e^{\frac{T_2}{T_1}}$$

B $\Delta S = R \log \frac{V_2}{V_1} + (C_V + R) \log \frac{T_2}{T_1}$

C $\Delta S = R \log \frac{V_2 T_2}{V_1 T_1} + C_V \log \frac{T_2}{T_1}$

D All of these are correct

QUESTION

When the following processes are carried out as given for diatomic ideal gas,

- I. temperature is made four times and simultaneously,**
- II. pressure is made one-fourth, then $(\Delta S)_{\text{system}}$ is**

A $9R\ln 2$

B $-9R\ln 2$

C $4R\ln 2$

D $8R\ln 2$



Entropy of Universe

1 Page blank.

QUESTION

Which is incorrect relation?

- A** $\Delta S_{(\text{System})} + (\Delta S)_{\text{Surrounding}} > 0$ for spontaneous process.
- B** $\Delta S_{(\text{System})} + (\Delta S)_{\text{Surrounding}} > 0$ for non-spontaneous process.
- C** $\Delta S_{(\text{System})} + (\Delta S)_{\text{Surrounding}} \leq 0$ for reversible change.
- D** $\Delta S_{(\text{System})} + (\Delta S)_{\text{Surrounding}} < 0$ for non-spontaneous change

QUESTION

A heated iron, block at 127°C loses 300 J of heat to surroundings at 27°C .

- (i) Find the entropy change of system (iron block)**
- (ii) Find the entropy change in surroundings.**
- (iii) Find the total change in entropy of universe due to above process.**

QUESTION

For the process, $\text{H}_2\text{O}(l) \longrightarrow \text{H}_2\text{O}(g)$, at T 100 °C and 1 atmosphere pressure, the correct choice is

- A** $\Delta S_{\text{system}} > 0$ and $\Delta S_{\text{surrounding}} > 0$
- B** $\Delta S_{\text{system}} > 0$ and $\Delta S_{\text{surroundings}} < 0$
- C** $\Delta S_{\text{system}} < 0$ and $\Delta S_{\text{Surroundings}} > 0$
- D** $\Delta S_{\text{system}} < 0$ and $\Delta S_{\text{surroundings}} < 0$

QUESTION

For the process $H_2O(l) \rightleftharpoons H_2O(s)$. Select the correct option.

A $\Delta H = -ve, \Delta S = +ve, \Delta V = -ve, \Delta G = 0$

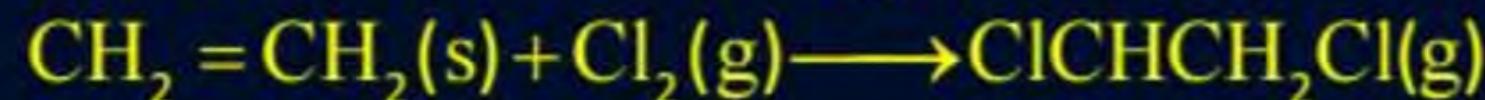
B $\Delta H = -ve, \Delta S = +ve, \Delta V = -ve, \Delta G = 0$

C $\Delta H = -ve, \Delta S = +ve, \Delta V = -ve, \Delta G = 0$

D $\Delta H = -ve, \Delta S = +ve, \Delta V = -ve, \Delta G = 0$

QUESTION

Consider the following reaction at temperature T:



$$\Delta_r H^0 = -217.5 \text{ kJ/mol}, \Delta_r S^0 = -233.9 \text{ J/K-mol}$$

Reaction is supported by:

- A** Entropy
- B** Enthalpy
- C** Both (A) & (B)
- D** Neither

QUESTION

For a reaction to occur spontaneously :

- A** ΔS must be negative
- B** $(-\Delta H + T\Delta S)$ must be positive
- C** $\Delta H + T\Delta S$ must be negative
- D** ΔH must be negative

QUESTION

Using the listed $[\Delta G_f^0 \text{ values}]$ calculate ΔG^0 for the reaction:



- A** -513.2
- B** -1037.0
- C** +433.4
- D** +225.0

QUESTION

From the following ΔH^0 and ΔS^0 values, predict which of reactions I, II and III would be spontaneous at 25°C.

A III

B I

C II and III

D I and II

	$\Delta H^0(\text{kJ})$	$\Delta S^0(\text{J/K})$
I.	+10.5	+30
II.	+1.8	-113
III.	-126	+84

QUESTION

Consider the ΔG_f° and ΔH_f° (kJ/mol) for the following oxides. Which oxide can be most easily decomposed to form the metal and oxygen gas?

- A** ZnO($\Delta G^{\circ} = -318.4$, $\Delta H^{\circ} = -348.3$)
- B** Cu₂O($\Delta G^{\circ} = -146.0$, $\Delta H^{\circ} = -168.8$)
- C** HgO($\Delta G^{\circ} = -58.5$, $\Delta H^{\circ} = -90.8$)
- D** PbO($\Delta G^{\circ} = -187.9$, $\Delta H^{\circ} = -217.3$)

QUESTION

For a spontaneous change, free energy change ΔG is:

- A** Positive
- B** Negative
- C** Zero
- D** Can be positive or negative

QUESTION – (NEET 2020 Covid)

If for a certain reaction Δ_rH is 30 kJ mol^{-1} at 450 K , the value of Δ_rS (in $\text{JK}^{-1}\text{ mol}^{-1}$) for which the same reaction will be spontaneous at the same temperature is:

A -33

B 33

C -70

D 70

QUESTION (NEET 2017)

For a given reaction, $\Delta H = 35.5 \text{ kJ mol}^{-1}$ and $\Delta S = 83.6 \text{ JK}^{-1} \text{ mol}^{-1}$. The reaction is spontaneous at : (Assume that ΔH and ΔS do not vary with temperature)

A $T > 425 \text{ K}$

B All temperatures

C $T > 298 \text{ K}$

D $T < 425 \text{ K}$

QUESTION – (NEET 2014)

For the reaction:



A 2.7 k cal

B - 2.7 k cal

C 9.3 k cal

D - 9.3 k cal

QUESTION (Kerala PMT 2012)

A chemical reaction is spontaneous at 298 K but non-spontaneous at 350 K.
Which one of the following is true for the reaction

	ΔG	ΔH	ΔS
A	-	-	+
B	+	+	+
C	+	-	+
D	-	-	-



Home work from modules

Prarambh \rightarrow Q 70 to Q 90

Prabal \rightarrow Q 8, 9, 15, 18, 23, 24



Magarmach Practice Questions (MPQ)



QUESTION – (NEET 2025)

The standard heat of formation, in kcal/mol of Ba^{2+} is:

[Given: standard heat of formation of SO_4^{2-} ion (aq) = -216 kcal/mol, standard heat of crystallization of $\text{BaSO}_4(s)$ = -4.5 kcal/mol, standard heat of formation of $\text{BaSO}_4(s)$ = -349 kcal/mol]

A -128.5

B -133.0

C +133.0

D +220.5

QUESTION – (NEET 2024)

Match List I with List II. Choose the correct answer from the option given.

- A** A-IV, B-III, C-II, D-I
- B** A-IV, B-II, C-III, D-I
- C** A-I, B-II, C-III, D-IV
- D** A-II, B-III, C-IV, D-I

	List - I (Process)		List (conditions)
A.	Isothermal process	I.	No heat exchange
B.	Isochoric process	II.	Carried out at constant temperature
C.	Isobaric process	III.	Carried out at constant volume
D.	Adiabatic process	IV.	Carried out at constant pressure

QUESTION – (NEET 2024)

In which of the following processes entropy increases?

- A. A liquid evaporates to vapour
- B. Temperature of a crystalline solid lowered from 130 K to 0 K.
- C. $2\text{NaHCO}_{3(\text{g})} \rightarrow \text{Na}_2\text{CO}_{3(\text{s})} + \text{CO}_{2(\text{g})} + \text{H}_2\text{O}_{(\text{g})}$
- D. $\text{Cl}_{2(\text{g})} \rightarrow 2\text{Cl}_{(\text{g})}$

Choose the correct answer from the options given below.

A A and C

B A, B and D

C A, C and D

D C and D

QUESTION – (NEET 2024)

The work done during reversible isothermal expansion of one mole of hydrogen gas at 25°C from pressure of 20 atmosphere to 10 atmosphere is:
(Given $R = 2.0 \text{ Cal K}^{-1} \text{ Mol}^{-1}$)

- A** 0 calorie
- B** - 413.14 calorie
- C** 413.14 calorie
- D** 100 calorie

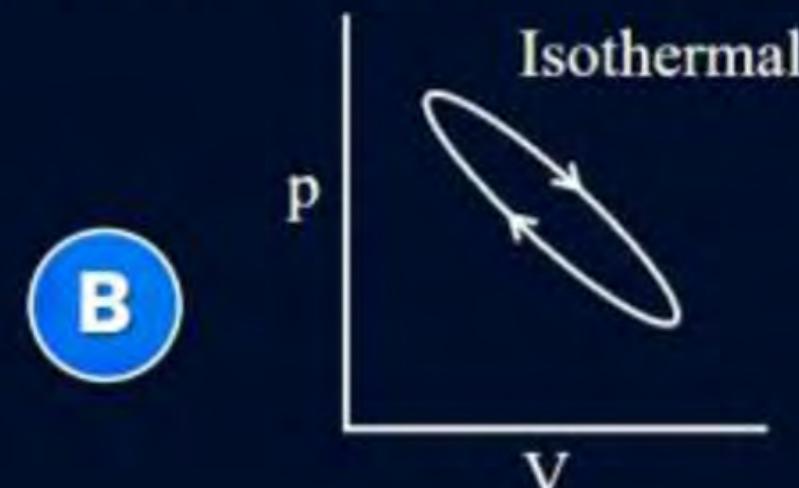
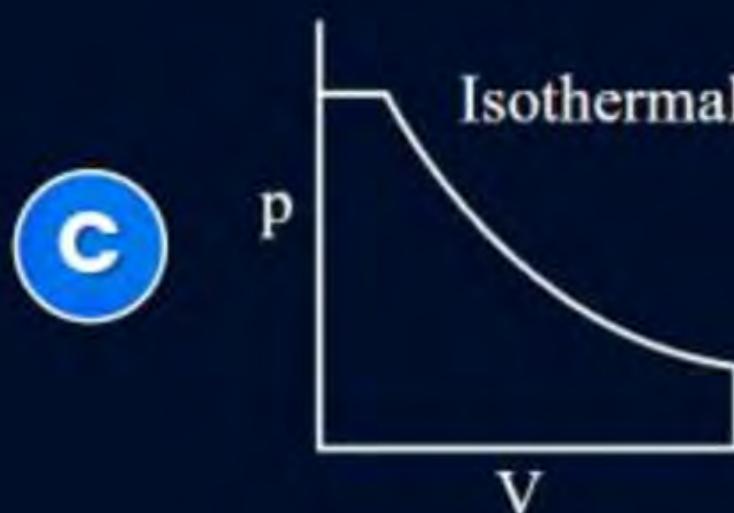
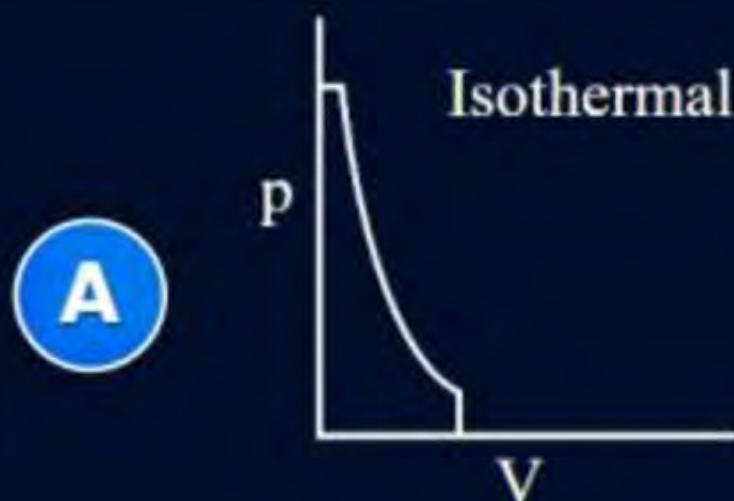
QUESTION – (NEET 2023)

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

- 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 – (NEET 2022)

Which of the following p-V curve represents maximum work done?



QUESTION – (NEET 2021)

For irreversible expansion of an ideal gas under isothermal condition, the correct option is:

- A** $\Delta U \neq 0, \Delta S_{\text{total}} \neq 0$
- B** $\Delta U = 0, \Delta S_{\text{total}} \neq 0$
- C** $\Delta U \neq 0, \Delta S_{\text{total}} = 0$
- D** $\Delta U = 0, \Delta S_{\text{total}} = 0$

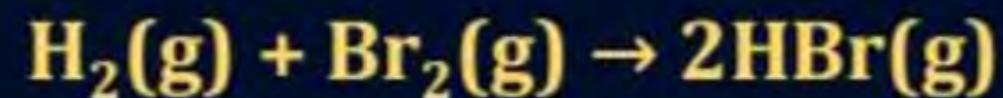
QUESTION – (NEET 2021)

Which one among the following is the correct option for right relationship between C_p and C_v for one mole of ideal gas?

- A** $C_p - C_v = R$
- B** $C_p = R C_v$
- C** $C_v = R C_p$
- D** $C_p + C_v = R$

QUESTION – (NEET 2020 Covid)

At standard conditions, if the change in the enthalpy for the following reaction is -109 kJ mol^{-1} .



Given that bond energy of H_2 and Br_2 is 435 kJ mol^{-1} and 192 kJ mol^{-1} , respectively, what is the bond energy (in kJ mol^{-1}) of HBr?

A 736

B 518

C 259

D 368

QUESTION – (NEET 2020 Covid)

If for a certain reaction Δ_rH is 30 kJ mol^{-1} at 450 K , the value of Δ_rS (in $\text{JK}^{-1}\text{ mol}^{-1}$) for which the same reaction will be spontaneous at the same temperature is:

- A** -33
- B** 33
- C** -70
- D** 70

QUESTION – (NEET 2020)

For the reaction, $2\text{Cl(g)} \rightarrow \text{Cl}_2\text{(g)}$, the correct option is:

- A** $\Delta_r\text{H} > 0$ and $\Delta_r\text{S} < 0$
- B** $\Delta_r\text{H} < 0$ and $\Delta_r\text{S} > 0$
- C** $\Delta_r\text{H} < 0$ and $\Delta_r\text{S} < 0$
- D** $\Delta_r\text{H} > 0$ and $\Delta_r\text{S} > 0$

QUESTION – (NEET 2020)

The correct option for free expansion of an ideal gas under adiabatic condition is:

- A** $q = 0, \Delta T < 0$ and $w > 0$
- B** $q < 0, \Delta T = 0$ and $w = 0$
- C** $q > 0, \Delta T > 0$ and $w > 0$
- D** $q = 0, \Delta T = 0$ and $w = 0$

QUESTION – (NEET 2019)

**Under isothermal condition, a gas at 300 K expands from 0.1 L to 0.25 L against a constant external pressure of 2 bar. The work done by the gas is:
(Given that 1 L bar = 100 J)**

- A** -30 J
- B** 5 kJ
- C** 25 J
- D** 30 J

QUESTION – (NEET 2019)

In which case change in entropy is negative?

- A** Evaporation of water
- B** Expansion of a gas at constant temperature
- C** Sublimation of solid to gas
- D** $2\text{H(g)} \rightarrow \text{H}_2\text{(g)}$

QUESTION – (NEET 2018)

The bond dissociation energies of X_2 , Y_2 and XY are in the ratio of 1 : 0.5 : 1. ΔH for the formation of XY is -200 kJ mol⁻¹. The bond dissociation energy of X_2 will be:

- A** 200 kJ mol⁻¹
- B** 100 kJ mol⁻¹
- C** 400 kJ mol⁻¹
- D** 800 kJ mol⁻¹

QUESTION – (NEET 2017 Delhi)

A gas is allowed to expand in a well insulated container against a constant external pressure of 2.5 atm from an initial volume of 2.50 L to a final volume of 4.50 L. The change in internal energy ΔU of the gas in Joules will be:

- A +505 J
- B 1136.25 J
- C -500 J
- D -505 J

QUESTION – (NEET 2017)

For a given reaction, $\Delta H = 35.5 \text{ kJ mol}^{-1}$ and $\Delta S = 83.6 \text{ JK}^{-1}\text{mol}^{-1}$. The reaction is spontaneous at: (Assume that ΔH and ΔS do not vary with temperature)

- A $T > 425 \text{ K}$
- B All temperatures
- C $T > 298 \text{ K}$
- D $T < 425 \text{ K}$

QUESTION – (NEET 2017 Delhi)

For a given reaction, $\Delta H = 35.5 \text{ KJ mol}^{-1}$ and $\Delta S = 83.6 \text{ JK}^{-1} \text{ mol}^{-1}$. The reaction is spontaneous at: (Assume that ΔH and ΔS do not vary with temperature)

- A** $T > 298 \text{ K}$
- B** $T < 425 \text{ K}$
- C** $T > 425 \text{ K}$
- D** All temperatures

QUESTION – (NEET 2016 - I)

Consider the following liquid-vapour equilibrium.

Liquid \rightleftharpoons Vapour. Which of the following relations is correct?

- A** $\frac{d\ln P}{dT^2} = \frac{-\Delta H_V}{T^2}$
- B** $\frac{d\ln P}{dT} = \frac{-\Delta H_V}{RT^2}$
- C** $\frac{d\ln G}{dT^2} = \frac{\Delta H_V}{RT^2}$
- D** $\frac{d\ln P}{dT} = \frac{-\Delta H_V}{RT}$

QUESTION – (NEET 2016 - II)

For a sample of perfect gas when its pressure is changed isothermally from P_i to P_f , the entropy change is given by:

- A $\Delta S = nRT \ln\left(\frac{P_f}{P_i}\right)$
- B $\Delta S = nRT \ln\left(\frac{P_i}{P_f}\right)$
- C $\Delta S = nR \ln\left(\frac{P_f}{P_i}\right)$
- D $\Delta S = nR \ln\left(\frac{P_i}{P_f}\right)$

QUESTION – (NEET 2016 - I)

The correct thermodynamic conditions for the spontaneous reaction at all temperatures is:

- A** $\Delta H < 0$ and $\Delta S < 0$
- B** $\Delta H < 0$ and $\Delta S = 0$
- C** $\Delta H > 0$ and $\Delta S < 0$
- D** $\Delta H < 0$ and $\Delta S > 0$

QUESTION – (NEET 2016)

The correct thermodynamic conditions for the spontaneous reaction at all temperatures is:

- A** $\Delta H > 0$ and $\Delta S > 0$
- B** $\Delta H > 0$ and $\Delta S < 0$
- C** $\Delta H < 0$ and $\Delta S > 0$
- D** $\Delta H < 0$ and $\Delta S < 0$

QUESTION – (NEET 2015)

The heat of combustion of carbon to CO_2 is -393.5 kJ/mol. The heat released upon formation of 35.2 g of CO_2 from carbon and oxygen gas is:

- A** +315 kJ
- B** -630 kJ
- C** -3.15 kJ
- D** -315 kJ

QUESTION – (NEET 2014)

For the reaction:



- A** 2.7 k cal
- B** - 2.7 k cal
- C** 9.3 k cal
- D** - 9.3 k cal

QUESTION – (NEET 2014)

For the reaction, $X_2O_4(l) \rightarrow 2XO_2(g)$, $\Delta U = 2.1$ kcal, $\Delta S = 20$ cal K⁻¹ at 300 K. Hence, ΔG is:

- A** -2.7 kcal
- B** 9.3 kcal
- C** -9.3 kcal
- D** 2.7 kcal

QUESTION – (AIPMT 2012)

In a closed insulated container, a liquid is stirred with a paddle to increase the temperature, which of the following is true?

- A** $\Delta E = W \neq 0, q = 0$
- B** $\Delta E = W = q \neq 0$
- C** $\Delta E = 0, W = q \neq 0$
- D** $W = 0, \Delta E = q \neq 0$

QUESTION – (AIPMT 2012)

Adiabatic expansions of an ideal gas is accompanied by

- A** decrease in ΔE
- B** increase in temperature
- C** decrease in ΔS
- D** no change in any one of the above properties

QUESTION – (AIPMT 2012)

Standard enthalpy of vaporization $\Delta_{\text{vap}}H^\circ$ for water at 100°C is $40.66 \text{ kJ mol}^{-1}$. The internal energy of vaporization of water at 100°C (in kJ mol^{-1}) is:
(Assume water vapour to behave like an ideal gas)

- A** + 37.56
- B** - 43.76
- C** + 43.76
- D** + 40.66

QUESTION – (AIPMT 2012)

The enthalpy of fusion of water is 1.435 kcal/mol. The molar entropy change for the melting of ice at 0°C is:

- A** 10.52 cal/(mol K)
- B** 21.04 cal/(mol K)
- C** 5.260 cal/(mol K)
- D** 0.526 cal/(mol K)

QUESTION – (AIPMT 2012)

In which of the following reactions, standard entropy change (ΔS°) is positive and standard Gibb's energy change (ΔG°) decreases sharply with increasing temperature?

- A $C(\text{graphite}) + \frac{1}{2} O_2(g) \rightarrow CO(g)$
- B $CO(g) + \frac{1}{2} O_2(g) \rightarrow CO_2(g)$
- C $Mg(s) + \frac{1}{2} O_2(g) \rightarrow MgO(s)$
- D $\frac{1}{2} C(\text{graphite}) + \frac{1}{2} O_2(g) \rightarrow \frac{1}{2} CO_2(g)$

QUESTION – (AIPMT 2012)

Equal volumes of two monoatomic gases, A and B, at same temperature and pressure are mixed. The ratio of specific heats (C_p/C_v) of the mixture will be:

- A** 0.83
- B** 1.50
- C** 3.3
- D** 1.67

QUESTION – (AIPMT 2011)

Enthalpy change for the reaction $4\text{H(g)} \rightarrow 2\text{H}_2\text{(g)}$ is -869 kJ. The dissociation energy of H-H bond is:

- A** - 434.8 kJ
- B** - 869.6 kJ
- C** + 434.8 kJ
- D** + 217.4 kJ

QUESTION – (AIPMT 2011)

Consider the following processes:

	$\Delta H(\text{kJ/mol})$
$\frac{1}{2} \text{ A} \rightarrow \text{B}$	+150
$3\text{B} \rightarrow 2\text{C} + \text{D}$	-125
$\text{E} + \text{A} \rightarrow 2\text{D}$	+350

For $\text{B} + \text{D} \rightarrow \text{E} + 2\text{C}$, ΔH will be:

- A** 525 kJ/mol
- B** -175 kJ/mol
- C** -325 kJ/mol
- D** 325 kJ/mol

QUESTION – (AIPMT 2011)

If the enthalpy change for the transition of liquid water to steam is 30 kJ mol^{-1} at 27°C , the entropy change for the process would be:

- A $10 \text{ J mol}^{-1} \text{ K}^{-1}$
- B $1.0 \text{ J mol}^{-1} \text{ K}^{-1}$
- C $0.1 \text{ J mol}^{-1} \text{ K}^{-1}$
- D $100 \text{ J mol}^{-1} \text{ K}^{-1}$

QUESTION – (AIPMT 2011)

Which of the following is correct option for free expansion of an ideal gas under adiabatic condition ?

- A** $q = 0, \Delta T \neq 0, w = 0$
- B** $q \neq 0, \Delta T = 0, w = 0$
- C** $q = 0, \Delta T = 0, w = 0$
- D** $q = 0, \Delta T < 0, w \neq 0$

QUESTION – (AIPMT 2011)

Enthalpy of $\text{CH}_4 + 1/2 \text{ O}_2 \rightarrow \text{CH}_3\text{OH}$ is negative. If enthalpy of combustion of CH_4 and CH_3OH are x and y respectively, then which relation is correct?

- A** $x > y$
- B** $x < y$
- C** $x = y$
- D** $x \geq y$

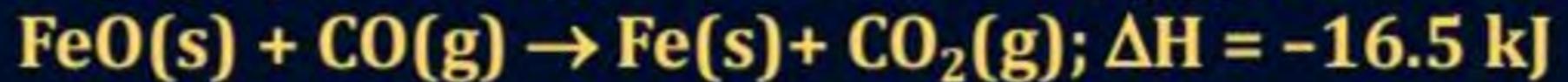
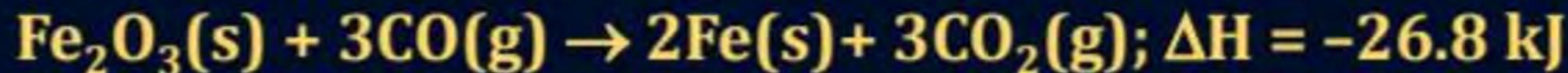
QUESTION – (AIPMT 2010)

Standard entropies of X_2 , Y_2 and XY_3 are 60, 40 and $50\text{ JK}^{-1}\text{mol}^{-1}$ respectively. For the reaction $\frac{1}{2} X_2 + \frac{3}{2} Y \rightleftharpoons XY_3$, $\Delta H = -30\text{ kJ}$ to be at equilibrium, the temperature should be:

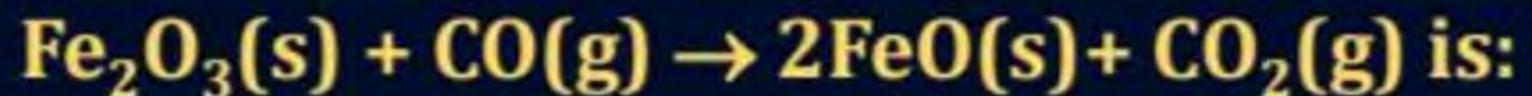
- A 750 K
- B 1000 K
- C 1250 K
- D 500 K

QUESTION – (AIPMT 2010)

The following two reactions are known:



The value of ΔH for the following reaction



A + 6.2 kJ

B + 10.3 kJ

C - 43.3 kJ

D - 10.3 kJ

QUESTION – (AIPMT 2010)

Three moles of an ideal gas expanded spontaneously into vacuum. The work done will be:

- A** Zero
- B** Infinite
- C** 3 Joules
- D** 9 Joules

QUESTION – (AIPMT 2010)

For vaporization of water at 1 atmospheric pressure, the values of ΔH and ΔS are $40.63 \text{ kJ mol}^{-1}$ and $108.8 \text{ JK}^{-1} \text{ mol}^{-1}$, respectively. The temperature when Gibbs energy change (ΔG) for this transformation will be zero, is:

- A** 293.4 K
- B** 273.4 K
- C** 393.4 K
- D** 373.4 K

QUESTION – (AIPMT 2010)

Match List-I (Equations) with List-II (Type of processes) and select the correct option.

(1) (2) (3) (4)

- A** (ii) (i) (iv) (iii)
- B** (i) (ii) (iii) (iv)
- C** (iii) (iv) (ii) (i)
- D** (iv) (i) (ii) (iii)

List I (Equations)		List II (Type of processes)	
(1)	$K_p > Q$	(i)	Non-spontaneous
(2)	$\Delta G^\circ < RT \ln Q$	(ii)	Equilibrium
(3)	$K_p = Q$	(iii)	Spontaneous and Endothermic
(4)	$T > \Delta H / \Delta S$	(iv)	Spontaneous

QUESTION – (AIPMT 2009)

The values of ΔH and ΔS for the reaction, $C(\text{graphite}) + \text{CO}_2(\text{g}) \rightarrow 2\text{CO}(\text{g})$ are 170 kJ and 170 J K^{-1} , respectively. This reaction will be spontaneous at

- A** 910 K
- B** 1110 K
- C** 510 K
- D** 710 K

QUESTION – (AIPMT 2009)

From the following bond energies:

H - H bond energy: 431.37 kJ mol⁻¹

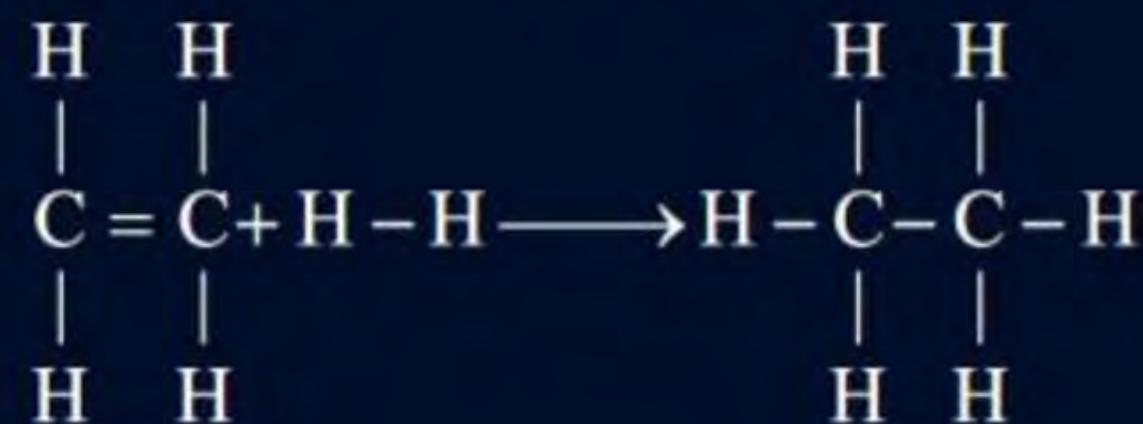
C - C bond energy: 336.49 kJ mol⁻¹

Enthalpy for the reaction, will be:

- A** - 243.6 kJ mol⁻¹
- B** -120.0 kJ mol⁻¹
- C** 553.0 kJ mol⁻¹
- D** 1523.6 kJ mol⁻¹

C = C bond energy: 606.10 kJ mol⁻¹

C - H bond energy: 410.50 kJ mol⁻¹



QUESTION – (AIPMT 2008)

For the gas phase reaction, $\text{PCl}_5(\text{g}) \rightleftharpoons \text{PCl}_3(\text{g}) + \text{Cl}_2(\text{g})$ which of the following conditions are correct?

- A** $\Delta H = 0$ and $\Delta S < 0$
- B** $\Delta H > 0$ and $\Delta S > 0$
- C** $\Delta H < 0$ and $\Delta S < 0$
- D** $\Delta H > 0$ and $\Delta S < 0$

QUESTION – (AIPMT 2008)

Bond dissociation enthalpy of H_2 , Cl_2 and HCl are 434, 242 and 431 kJ mol^{-1} respectively. Enthalpy of formation of HCl is:

- A** 93 kJ mol^{-1}
- B** - 245 kJ mol^{-1}
- C** - 93 kJ mol^{-1}
- D** 245 kJ mol^{-1}

QUESTION – (AIPMT 2008)

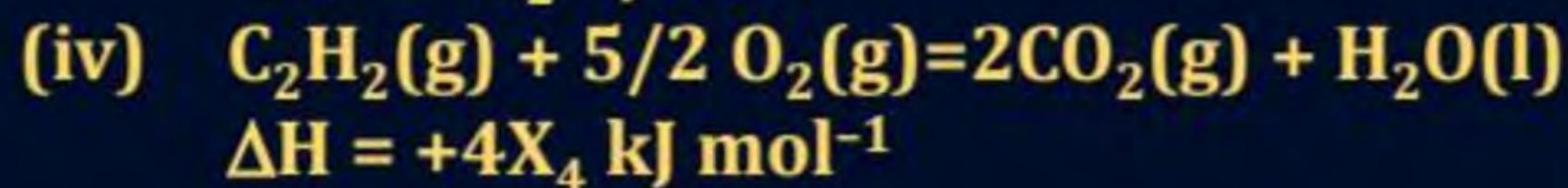
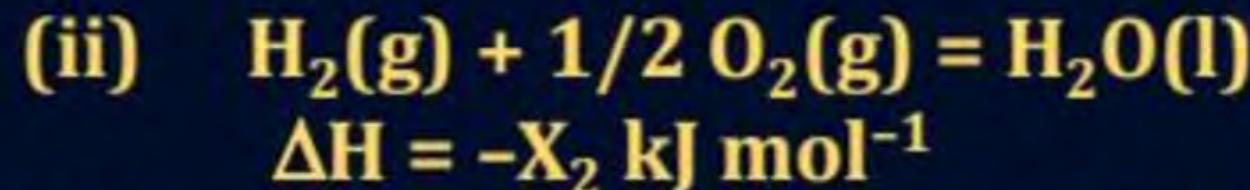
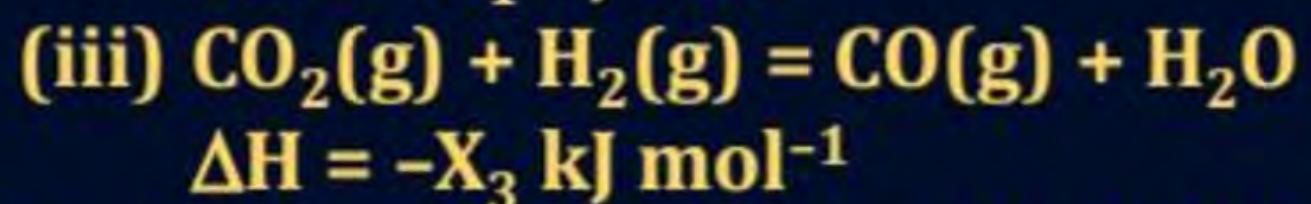
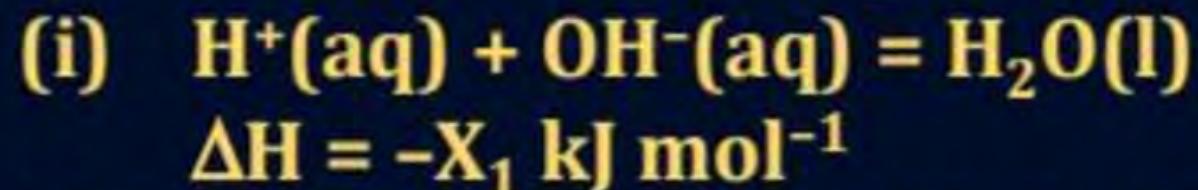
Which of the following are not state functions?

- | | |
|-------------|---------------|
| (I) $q + w$ | (II) q |
| (III) w | (IV) $H - TS$ |

- A** (I) and (IV)
 - B** (II), (III) and (IV)
 - C** (I), (II) and (III)
 - D** (II) and (III)

QUESTION – (AIPMT 2007)

Consider the following reactions:



Enthalpy of formation of $H_2O(l)$ is:

A $+ X_3 \text{ kJ mol}^{-1}$

B $- X_4 \text{ kJ mol}^{-1}$

C $+ X_1 \text{ kJ mol}^{-1}$

D $- X_2 \text{ kJ mol}^{-1}$

QUESTION – (AIPMT 2007)

Given that bond energies of H - H and Cl - Cl are 430 kJ mol^{-1} and 240 kJ mol^{-1} respectively and ΔH_f for HCl is -90 kJ mol^{-1} , bond enthalpy of HCl is:

- A** 380 kJ mol^{-1}
- B** 425 kJ mol^{-1}
- C** 245 kJ mol^{-1}
- D** 290 kJ mol^{-1}

QUESTION – (AIPMT 2006)

The enthalpy of hydrogenation of cyclohexene is $-119.5 \text{ kJ mol}^{-1}$. If resonance energy of benzene is $-150.4 \text{ kJ mol}^{-1}$, its enthalpy of hydrogenation would be:

- A** $-208.1 \text{ kJ mol}^{-1}$
- B** $-269.9 \text{ kJ mol}^{-1}$
- C** $-358.5 \text{ kJ mol}^{-1}$
- D** $-508.9 \text{ kJ mol}^{-1}$

QUESTION – (AIPMT 2006)

Assume each reaction is carried out in an open container. For which reaction will $\Delta H = \Delta E$?

- A** $C(s) + 2H_2O(g) \rightarrow 2H_2(g) + CO_2(g)$
- B** $PCl_5(g) \rightarrow PCl_3(g) + Cl_2(g)$
- C** $2CO(g) + O_2(g) \rightarrow 2CO_2(g)$
- D** $H_2(g) + Br_2(g) \rightarrow 2HBr(g)$

QUESTION – (AIPMT 2006)

The enthalpy and entropy change for the reaction $\text{Br}_2(\text{l}) + \text{Cl}_2(\text{g}) \rightarrow 2\text{BrCl}(\text{g})$ are 30 kJ mol^{-1} and $105 \text{ JK}^{-1} \text{ mol}^{-1}$ respectively. The temperature at which the reaction will be in equilibrium is:

- A** 273 K
- B** 450 K
- C** 300 K
- D** 285.7 K

QUESTION – (AIPMT 2006)

Identify the correct statement for change of Gibbs energy for a system (ΔG_{system}) at constant temperature and pressure:

- A** If $\Delta G_{\text{system}} = 0$, the system has attained equilibrium.
- B** If $\Delta G_{\text{system}} = 0$, the system is still moving in a particular direction.
- C** If $\Delta G_{\text{system}} < 0$, the process is not spontaneous.
- D** If $\Delta G_{\text{system}} > 0$, the process is spontaneous.

QUESTION – (AIPMT 2005)

The absolute enthalpy of neutralization of the reaction:
 $\text{MgO(s)} + 2\text{HCl(aq.)} \rightarrow \text{MgCl}_2\text{(aq.)} + \text{H}_2\text{O(l)}$ will be:

- A** -57.33 kJ mol⁻¹
- B** Greater than -57.33 kJ mol⁻¹
- C** Less than -57.33 kJ mol⁻¹
- D** 57.33 kJ mol⁻¹

QUESTION – (AIPMT 2005)

A reaction occurs spontaneously if

- A** $T\Delta S < \Delta H$ and both ΔH and ΔS are + ve
- B** $T\Delta S > \Delta H$ and ΔH is + ve and ΔS is - ve
- C** $T\Delta S > \Delta H$ and both ΔH and ΔS are + ve
- D** $T\Delta S = \Delta H$ and both ΔH and ΔS are + ve

QUESTION – (AIPMT 2005)

Which of the following pairs of a chemical reaction is certain to result in a spontaneous reaction?

- A** Exothermic and increasing disorder
- B** Exothermic and decreasing disorder
- C** Endothermic and increasing disorder
- D** Endothermic and decreasing disorder

QUESTION – (AIPMT 2004)

Standard enthalpy and standard entropy changes for the oxidation of ammonia at 298 K are $-382.64 \text{ kJ mol}^{-1}$ and $-145.6 \text{ JK}^{-1} \text{ mol}^{-1}$, respectively. Standard Gibb's energy change for the same reaction at 298 K is:

- A** 22.1 kJ mol^{-1}
- B** $-339.3 \text{ kJ mol}^{-1}$
- C** $-439.3 \text{ kJ mol}^{-1}$
- D** $-523.2 \text{ kJ mol}^{-1}$

QUESTION – (AIPMT 2004)

Considering entropy (S) as a thermodynamic parameter, the criterion for the spontaneity of any process is:

- A** $\Delta S_{\text{system}} + \Delta S_{\text{surroundings}} > 0$
- B** $\Delta S_{\text{system}} - \Delta S_{\text{surroundings}} > 0$
- C** $\Delta S_{\text{system}} > 0$ only
- D** $\Delta S_{\text{surroundings}} > 0$ only

QUESTION – (AIPMT 2004)

If the bond energies of H-H, Br-Br, and H-Br are 433, 192 and 364 kJ mol⁻¹ respectively, the ΔH° for the reaction $H_2(g) + Br_2(g) \rightarrow 2HBr(g)$ is:

- A - 261 kJ
- B + 103 kJ
- C + 261 kJ
- D - 103 kJ

QUESTION – (AIPMT 2004)

The work done during the expansion of a gas from a volume of 4 dm^3 to 6 dm^3 against a constant external pressure of 3 atm is: ($1 \text{ L atm} = 101.32 \text{ J}$)

- A** - 6 J
- B** - 608 J
- C** + 304 J
- D** - 304 J

QUESTION – (AIPMT 2003)

The molar heat capacity of water at constant pressure is $75 \text{ JK}^{-1} \text{ mol}^{-1}$. When 1 kJ of heat is supplied to 100 g of water, which is free to expand, the increase in temperature of water is:

- A** 6.6 K
- B** 1.2 K
- C** 2.4 K
- D** 4.8 K

QUESTION – (AIPMT 2003)

For which one of the following equations is $\Delta H^\circ_{\text{react}}$ equal to ΔH°_f for the product?

- A** $2\text{CO(g)} + \text{O}_2\text{(g)} \rightarrow 2\text{CO}_2\text{(g)}$
- B** $\text{N}_2\text{(g)} + \text{O}_3\text{(g)} \rightarrow \text{N}_2\text{O}_3\text{(g)}$
- C** $\text{CH}_4\text{(g)} + 2\text{Cl(g)} \rightarrow \text{CH}_2\text{Cl}_2\text{(l)} + 2\text{HCl(g)}$
- D** $\text{Xe(g)} + 2\text{F}_2\text{(g)} \rightarrow \text{XeF}_4\text{(g)}$

QUESTION – (AIPMT 2003)

For the reaction $C_3H_8(g) + 5O_2(g) \rightarrow 3CO_2(g) + 4H_2O(l)$
at constant temperature, $\Delta H - \Delta E$ is:

- A** - RT
- B** + RT
- C** - 3 RT
- D** + 3 RT

QUESTION – (AIPMT 2003)

What is the entropy change (in $\text{JK}^{-1} \text{ mol}^{-1}$) when one mole of ice is converted into water at 0° C ? (The enthalpy change for the conversion of ice to liquid water is 6.0 kJ mol^{-1} at 0°C)

- A** 21.98
- B** 20.13
- C** 2.013
- D** 2.198

QUESTION – (AIPMT 2002)

2 mole of an ideal gas at 27°C temperature is expanded reversibly from 2 lit to 20 lit. Find the entropy change ($R = 2 \text{ cal/mol K}$)

- A** 92.1
- B** 0
- C** 4
- D** 9.2

QUESTION – (AIPMT 2002)**Unit of entropy is:**

- A** $\text{JK}^{-1} \text{ mol}^{-1}$
- B** J mol^{-1}
- C** $\text{J}^{-1}\text{K}^{-1} \text{ mol}^{-1}$
- D** JK mol^{-1}

QUESTION – (AIPMT 2002)

Heat of combustion ΔH° for C(s), H₂(g) and CH₄(g) are -94, -68 and -213 kcal/mol, then ΔH° for C(s) + 2H₂(g) \rightarrow CH₄(g) is:

- A -17 kcal
- B - 111 kcal
- C -170 kcal
- D -85 kcal

QUESTION – (AIPMT 2001)

When 1 mol of a gas is heated at constant volume, temperature is raised from 298 to 308 K. If heat supplied to the gas is 500 J, then which statement is correct ?

- A** $q = w = 500 \text{ J}, \Delta U = 0$
- B** $q = \Delta U = 500 \text{ J}, w = 0$
- C** $q = -w = 500 \text{ J}, \Delta U = 0$
- D** $\Delta U = 0, q = w = -500 \text{ J}$

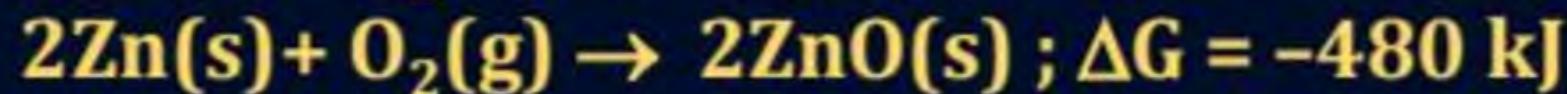
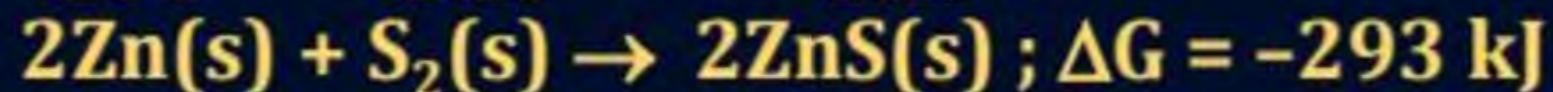
QUESTION – (AIPMT 2001)

What is the enthalpy change for, $2\text{H}_2\text{O}_2(\text{l}) \rightarrow 2\text{H}_2\text{O}(\text{l}) + \text{O}_2(\text{g})$ if heat of formation of $\text{H}_2\text{O}_2(\text{l})$ and $\text{H}_2\text{O}(\text{l})$ are -188 and -286 kJ/mol respectively?

- A** -196 kJ/mol
- B** + 948 kJ/mol
- C** + 196 kJ/mol
- D** -948 kJ/mol

QUESTION – (AIPMT 2000)

The factor of ΔG values is important in metallurgy. The ΔG values for the following reactions at 800°C are given as:



Then ΔG for the reaction: $2\text{ZnS}(\text{s}) + 3\text{O}_2(\text{g}) \rightarrow 2\text{ZnO}(\text{s}) + 2\text{SO}_2(\text{s})$ will be:

A -357 kJ

B -731 kJ

C -773 kJ

D -229 kJ

QUESTION – (AIPMT 2000)

The entropy change in the fusion of one mole of a solid melting at 27°C (Latent heat of fusion, 2930 J mol⁻¹) is:

- A** 9.77 J K⁻¹ mol⁻¹
- B** 10.73 J K⁻¹ mol⁻¹
- C** 2930 J K⁻¹ mol⁻¹
- D** 108.5 J K⁻¹ mol⁻¹

QUESTION – (AIPMT 2000)

The values of heat of formation of SO_2 and SO_3 are -298.2 kJ and -98.2 kJ. The heat of formation of the reaction $\text{SO}_2 + (1/2)\text{O}_2 \rightarrow \text{SO}_3$ will be:

- A** -200 kJ
- B** -356.2 kJ
- C** + 200 kJ
- D** - 396.2 kJ

QUESTION – (AIPMT 1999)

For a cyclic process, which of the following is not true?

- A** $\Delta H = 0$
- B** $\Delta E = 0$
- C** $\Delta G = 0$
- D** Total $W = 0$

QUESTION – (AIPMT 1999)

For a reaction in which all reactants and products are liquids, which one of the following equations is most applicable?

- A** $\Delta H < \Delta E$
- B** $\Delta H = \Delta S$
- C** $\Delta H = \Delta E$
- D** $\Delta H = \Delta G$

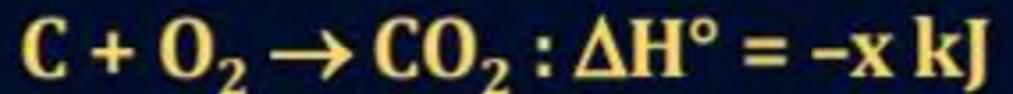
QUESTION – (AIPMT 1998)

One mole of an ideal gas at 300 K is expanded isothermally from an initial volume of 1 litre to 10 litres. The ΔE for this process is: ($R = 2 \text{ cal mol}^{-1} \text{ K}^{-1}$)

- A** 163.7 cal
- B** zero
- C** 1381.1 cal
- D** 9 lit. atm

QUESTION – (AIPMT 1997)

Given that



the enthalpy of formation of carbon monoxide will be:

A $(2x - y)/2$

B $(y - 2x)/2$

C $2x - y$

D $y - 2x$

QUESTION – (AIPMT 1996)

Hydrogen has an ionization energy of 1311 kJ mol^{-1} and for chlorine it is 1256 kJ mol^{-1} . Hydrogen forms $\text{H}^+(\text{aq.})$ ions but chlorine does not form $\text{Cl}^+(\text{aq.})$ ions because

- A** H^+ has lower hydration enthalpy.
- B** Cl^+ has lower hydration enthalpy.
- C** Cl has high electron affinity.
- D** Cl has high electronegativity.

QUESTION – (AIPMT 1995)

If enthalpies of formation of $\text{C}_2\text{H}_4(\text{g})$, $\text{CO}_2(\text{g})$ and $\text{H}_2\text{O}(\text{l})$ at 25°C and 1 atm pressure are 52, - 394 and - 286 kJ/mol respectively, the enthalpy of combustion of C_2H_4 is equal to

- A** - 141.2 kJ/mol
- B** - 1412 kJ/mol
- C** + 14.2 kJ/mol
- D** + 1412 kJ/mol

QUESTION – (AIPMT 1994)

Equal volumes of molar hydrochloric acid and Sulphuric acid are neutralized by dil. NaOH solution and x kcal and y kcal of heat are liberated respectively. Which of the following is true?

- A** $x = y$
- B** $x = 1/2 y$
- C** $x = 2y$
- D** None of these

QUESTION – (AIPMT 1994)

For the reaction $\text{N}_2 + 3\text{H}_2 \rightleftharpoons 2\text{NH}_3$, $\Delta H = ?$

A $\Delta E + 2RT$

B $\Delta E - 2RT$

C $\Delta H = RT$

D $\Delta E - RT$

QUESTION – (AIPMT 1991, 94)

During isothermal expansion of an ideal gas, its

- A** internal energy increases
- B** enthalpy decreases
- C** enthalpy remains unaffected
- D** enthalpy reduces to zero

QUESTION – (AIPMT 1990)

If ΔH is the change in enthalpy and ΔE , the change in internal energy accompanying a gaseous reaction, then

- A** ΔH is always greater than ΔE
- B** $\Delta H < \Delta E$ only if the number of moles of the products is greater than the number of moles of the reactants
- C** ΔH is always less than ΔE
- D** $\Delta H < \Delta E$ only if the number of moles of products is less than the number of moles of the reactants

QUESTION – (AIPMT 1998)

Identify the correct statement regarding entropy:

- A** At absolute zero of temperature, entropy of a perfectly crystalline substance is taken to be zero.
- B** At absolute zero of temperature, the entropy of a perfectly crystalline substance is +ve.
- C** At absolute zero of temperature, the entropy of all crystalline substances is taken to be zero.
- D** At 0°C , the entropy of a perfectly crystalline substance is taken to be zero.

QUESTION – (AIPMT 1996)

According to the third law of thermodynamics which one of the following quantities for a perfectly crystalline solid is zero at absolute zero?

- A** Free energy
- B** Entropy
- C** Enthalpy
- D** Internal energy

QUESTION – (AIPMT 1996)

Given the following entropy values (in $\text{J K}^{-1} \text{ mol}^{-1}$) at 298 K and 1 atm : $\text{H}_2(\text{g})$: 130.6, $\text{Cl}_2(\text{g})$: 223.0, $\text{HCl}(\text{g})$: 186.7. The entropy change (in $\text{J K}^{-1} \text{ mol}^{-1}$) for the reaction $\text{H}_2(\text{g}) + \rightarrow \text{Cl}(\text{g}) + 2\text{HCl}(\text{g})$ is:

- A +540.3
- B +727.0
- C -166.9
- D +19.8

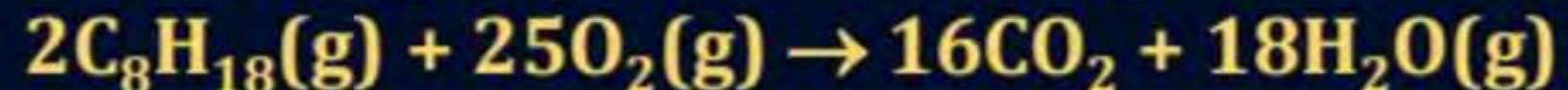
QUESTION – (AIPMT 1994)

A chemical reaction will be spontaneous if it is accompanied by a decrease of

- A** entropy of the system
- B** enthalpy of the system
- C** internal energy of the system
- D** free energy of the system

QUESTION – (AIPMT 1994)

Consider the following reaction occurring in an Automobile



the sign of ΔH , ΔS and ΔG would be:

- A** +, -, +
- B** -, +, -
- C** -, +, +
- D** +, +, -

**THANK
YOU**