YAKEEN NEET 2.0

2026

Solutions

Physical Chemistry | Lecture -06

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Topics to be covered

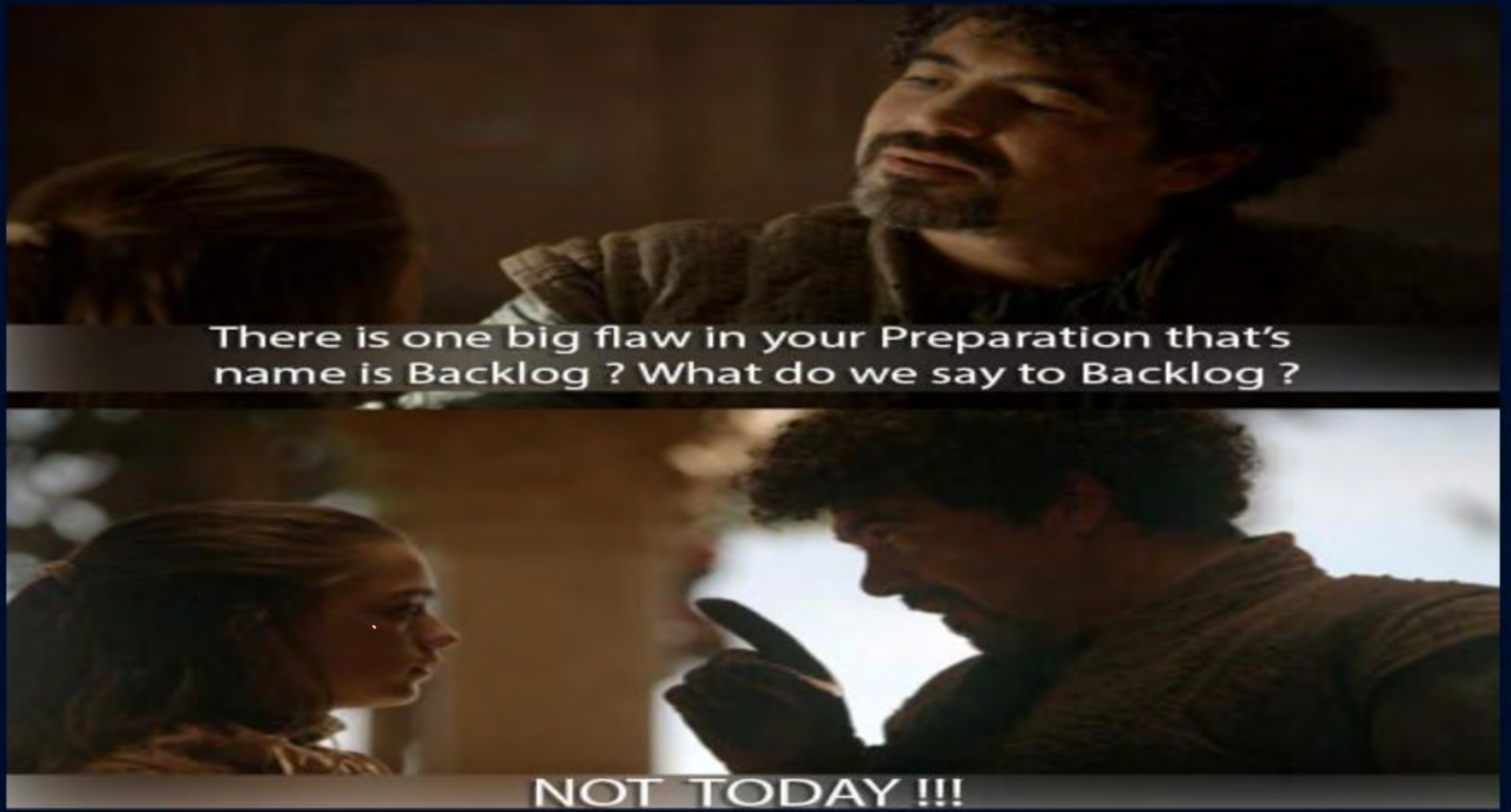
1. Revision of Last Class, Medics test
2. Non ideal solution
3. Azeotropes
4. Magarmach Practice Questions, Home work from modules

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

Mastery
Checks your grasp over NEET-level concepts

Evaluation
Judging both knowledge and test-smartness

Decision Making
Testing your speed + accuracy under pressure

Intuition
Some answers need gut + logic – can you spot the trick?

Concepts
It's all about strong basics – no shortcuts here

Strategy
The MEDICS test – built for those who heal, hustle, and hope.

QUESTION

The oxidation state of chromium in the final product formed in the reaction between KI and acidified potassium dichromate solution is

$$Cr_2O_7^{2-} + H^+ + I^- \rightarrow I_2 + Cr^{3+} + H_2O$$

(A) +4

(B) +6

(C) +2

(D) +3

QUESTION

The number of moles of $KMnO_4$ reduced by 1 mol of KI in alkaline medium is

A. 1

B. 2

C. 5

D. 1/5

$$\underset{\downarrow}{MnO_4^-} + \underset{\downarrow}{I^-} \longrightarrow \overset{+5}{I}O_3^- + MnO_2$$

$n_f = 3$ $\quad$ $n_f = 6$

$\text{moles} \times 3 = 1 \times 6$

$\text{moles} = \frac{6}{3} = 2$

QUESTION

The oxidation number of carbon in CH_2Cl_2 is

$x + 2 - 2 = 0$

$x = 0$

A 0

B 2

C 3

D 5

QUESTION

Balance the following reactions:

$$U(SO_4)_2 + KMnO_4 + H_2O \longrightarrow H_2SO_4 + K_2SO_4 + MnSO_4 + UO_2SO_4$$

$x - 4 - 2 = 0$
$x = +6$

$$5U^{4+} + 2MnO_4^{-} + 2H_2O \Rightarrow 4H^{+} + 2Mn^{2+} + 5UO_2^{2-}$$

(+7 on MnO_4^-; +6 on UO_2^{2-})

9 ox.

10 oxy.

QUESTION

$$\overset{+5}{3KClO_3} + 3H_2SO_4 \longrightarrow 3KHSO_4 + \overset{+7}{HClO_4} + 2\overset{+4}{ClO_2} + H_2O$$

Equivalent weight of $KClO_3$ is

Total $n_f = \frac{2\times1}{2+1} = \frac{2}{3}$ 3

(A) $\frac{M}{4}$ $n_{f\,oxid} = 1|5-7| = 2$

(B) $\frac{M}{2}$ $n_{f\,red} = 1|5-4| = 1$

$E = \frac{3M}{2}$

(C) $\left(M + \frac{M}{2}\right)$

(D) $\left(\frac{M}{4} + \frac{M}{2}\right)$

QUESTION

How many moles of electron weigh 1 kg?

(A) 6.023×10^{23}

(B) $\frac{1}{9.108} \times 10^{23}$

(C) $\frac{6.023}{9.108} \times 10^{54}$

(D) $\frac{1}{9.108 \times 6.023} \times 10^{8}$

Total mass = 1 Kg.

mass of e^- = 9.1×10^{-31} Kg

No. of e^- = $\frac{1}{9.1 \times 10^{-31}}$

moles of e^- = $\frac{1}{9.1 \times 10^{-31} \times 6.022 \times 10^{23}}$

10^{-8}

$= \frac{10^8}{9.1 \times 6.022}$

QUESTION

If 100 mL of H_2SO_4 and 100 mL of H_2O are mixed, the mass percent of H_2SO_4 in the resulting solution is ($d_{H_2SO_4}$ = 0.09 g mL, d_{H_2O} = 1.0 g ml^{-1})

A 90

B 47.36

C 50

D 60

$W_{H_2SO_4} = 100 \times 0.09 = 9g$

$W_{H_2O} = 100 \times 1 = 100g$

Total mass = 109g

mass % of $H_2SO_4 = \frac{9}{109} \times 100$

$= \frac{900}{109}$

$= 8.25\%$

QUESTION

$\frac{46.6}{22400} \times 32$ g.

0.1 g of metal combines with 46.6 mL of oxygen at STP. The equivalent weight of metal is

Metal + O_2 → Metal oxide.

$\frac{0.1}{E_M} = \frac{46.6 \times 32}{22400 \times 8}$

$\frac{4660}{466}$

5600

$E_M = \frac{5600}{466}$

A 12

B 24

C 6

D 36

QUESTION

10 g of $CaCO_3$ contains

$\frac{10}{100} = 0.1$ $100\,g\ CaCO_3 = 1\,g$ atom of Ca

$1\,g$ $= \frac{1}{100} \times 10 = 0.1\,g$ atom of Ca.

A ✗ 10 moles of $CaCO_3$

B ✓ 0.1 g atom of Ca

C ✗ 6×10^{23} atoms of Ca

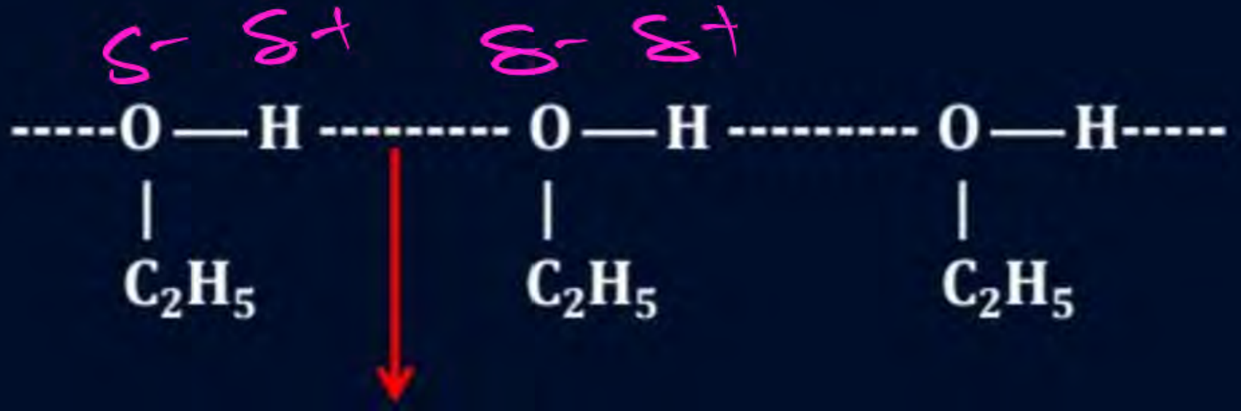
D 0.1 of equivalent of Ca

Revision of Last class

H-Bonding

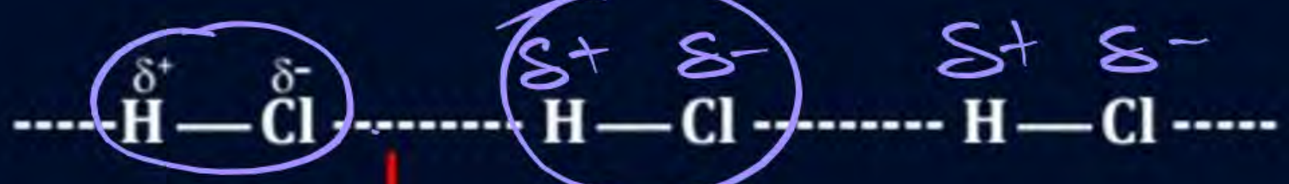
Strong force of attraction between H & F, O, N

HF, C_2H_5OH, H_2O, NH_3

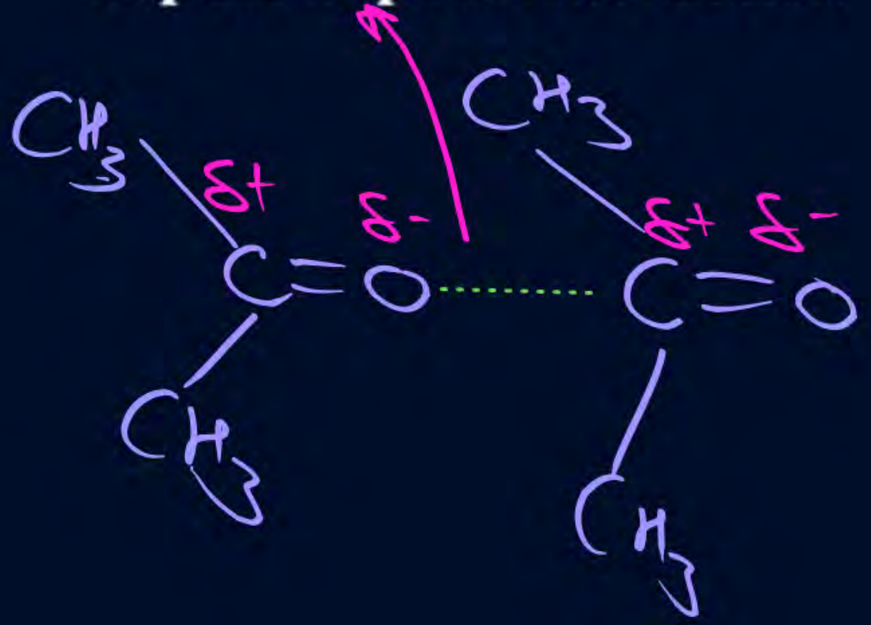


Intermolecular H-Bonding

HCl

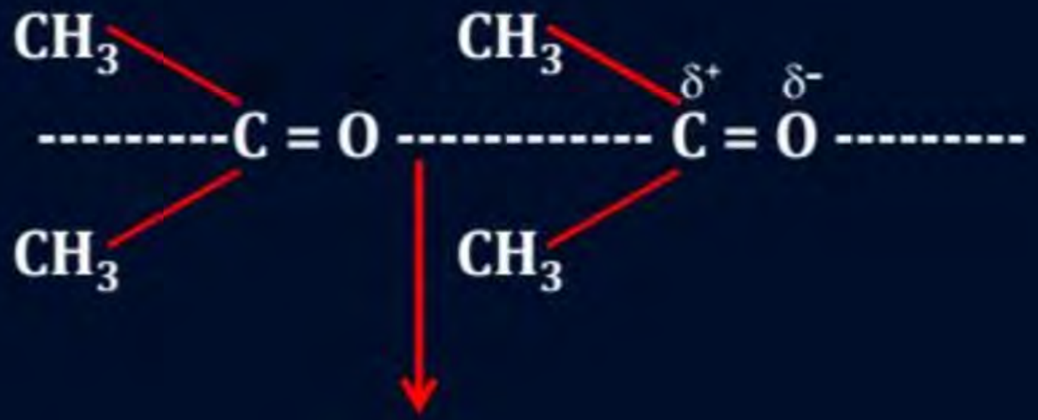


Dipole-Dipole Interaction



H-Bond > Dipole-Dipole interaction.

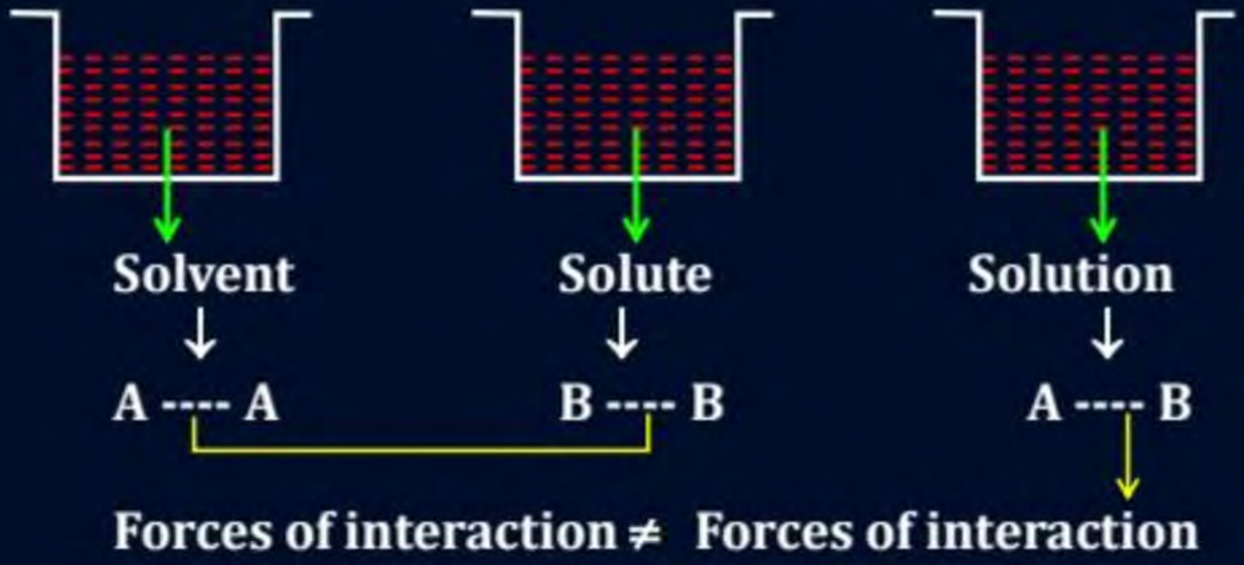
I.M.F. ↑



Dipole-Dipole Interaction

Non-Ideal Solutions

- Solutions which do not obey Raoult's law at all temperature & pressure.



Properties of Non-ideal Solutions

#MIT

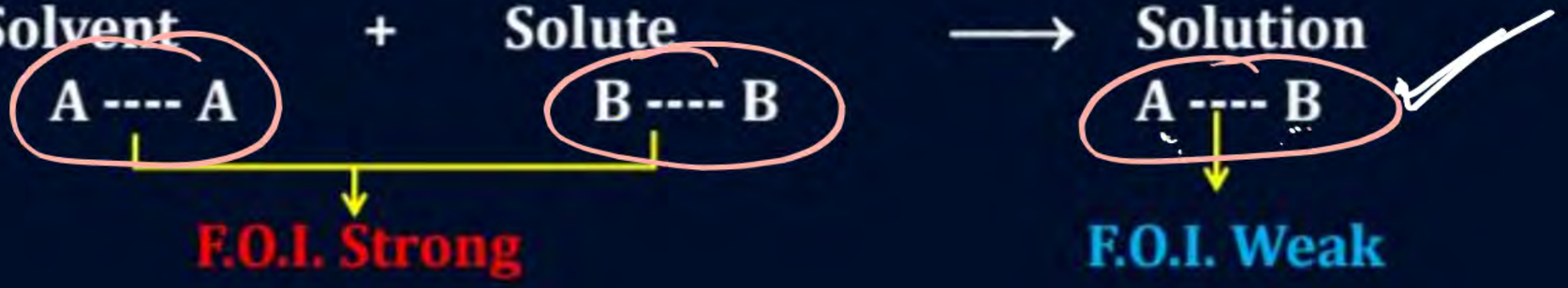
1. $P_S \neq P_A^\circ X_A + P_B^\circ X_B$
2. $\Delta G_{mix} = (-)ve$] → Spontaneous
3. $\Delta S_{mix} = (+)ve$]
4. $\Delta V_{mix.} \neq 0$
5. $\Delta H_{mix.} \neq 0$
6. $\Delta U_{mix} \neq 0$
7. $\Delta P = P_{Observed} - P_{Calculated} \neq 0$

Type of Non-ideal Solutions

- **Positive Deviation:**
- **Negative Deviation:**

Positive deviation :-
~~Type of Non-ideal Solutions~~

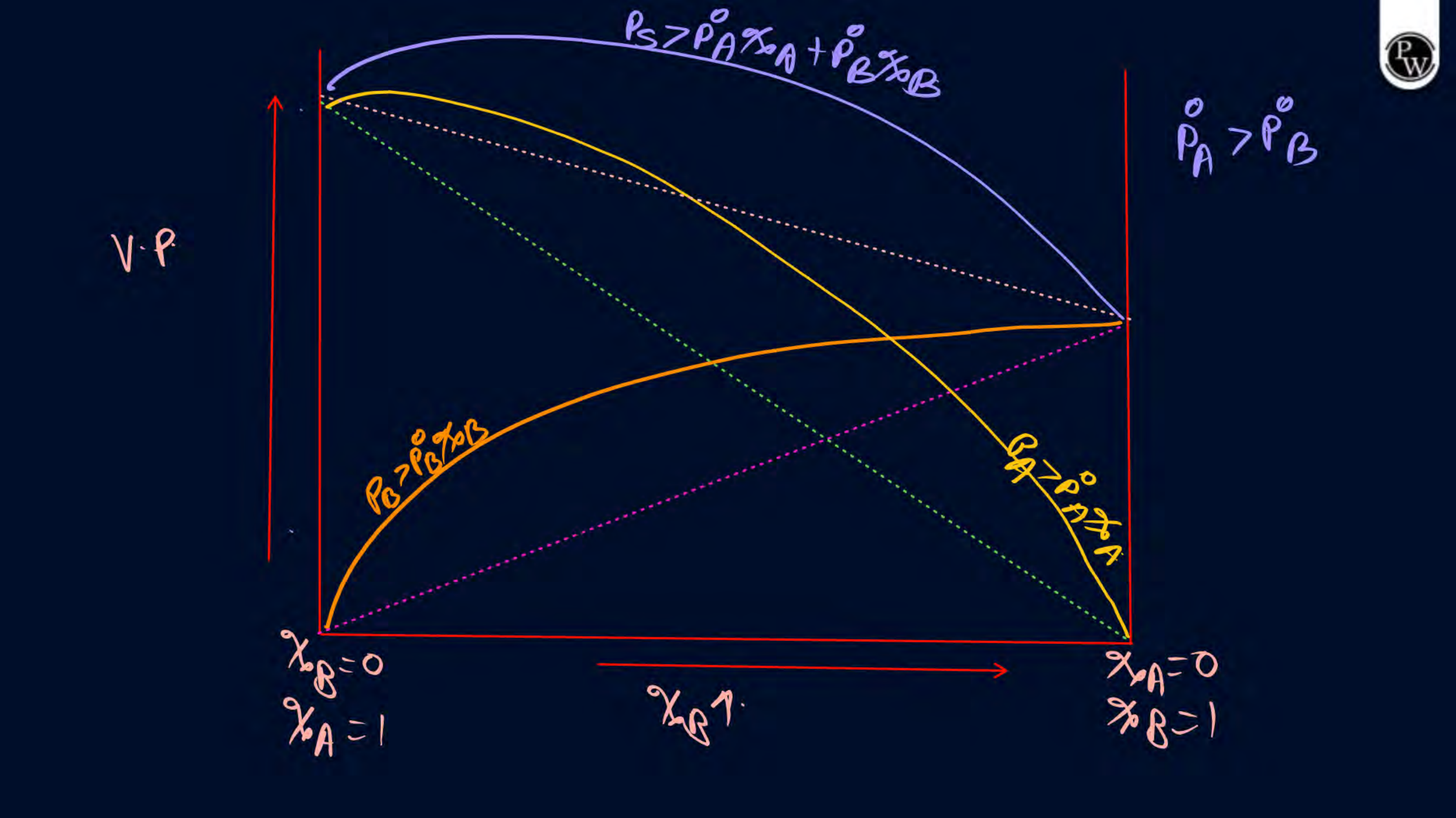
- Solvent + Solute ⟶ Solution



- $P_s > P°_A\chi_A + P°_B\chi_B$
- ΔH_{mixing} = (+)ve ⇒ Endothermic or Heat absorb or Temperature decreases
- ΔV_{mixing} = (+)ve
- ΔG_{mixing} = (−)ve
- ΔS_{mixing} = (+)ve

$\Delta U_{mix.}$ = (+)ve.

] ; spontaneous


$P_S > P^\circ_A \chi_{oA} + P^\circ_B \chi_{oB}$
$P^\circ_A > P^\circ_B$
V.P
$P_B > P^\circ_B \chi_{oB}$
$P_A > P^\circ_A \chi_A$
$\chi_{oB} = 0$
$\chi_{oA} = 1$
$\chi_B \uparrow$
$\chi_{oA} = 0$
$\chi_{oB} = 1$

Negative Deviation from Raoult's Law

① Solvent + Solute ⟶ Solution

A ---- A B ---- B ✓A ---- B

$P_S < P^\circ_A x_A + P^\circ_B x_B$

F.O.I Weak F.O.I Strong

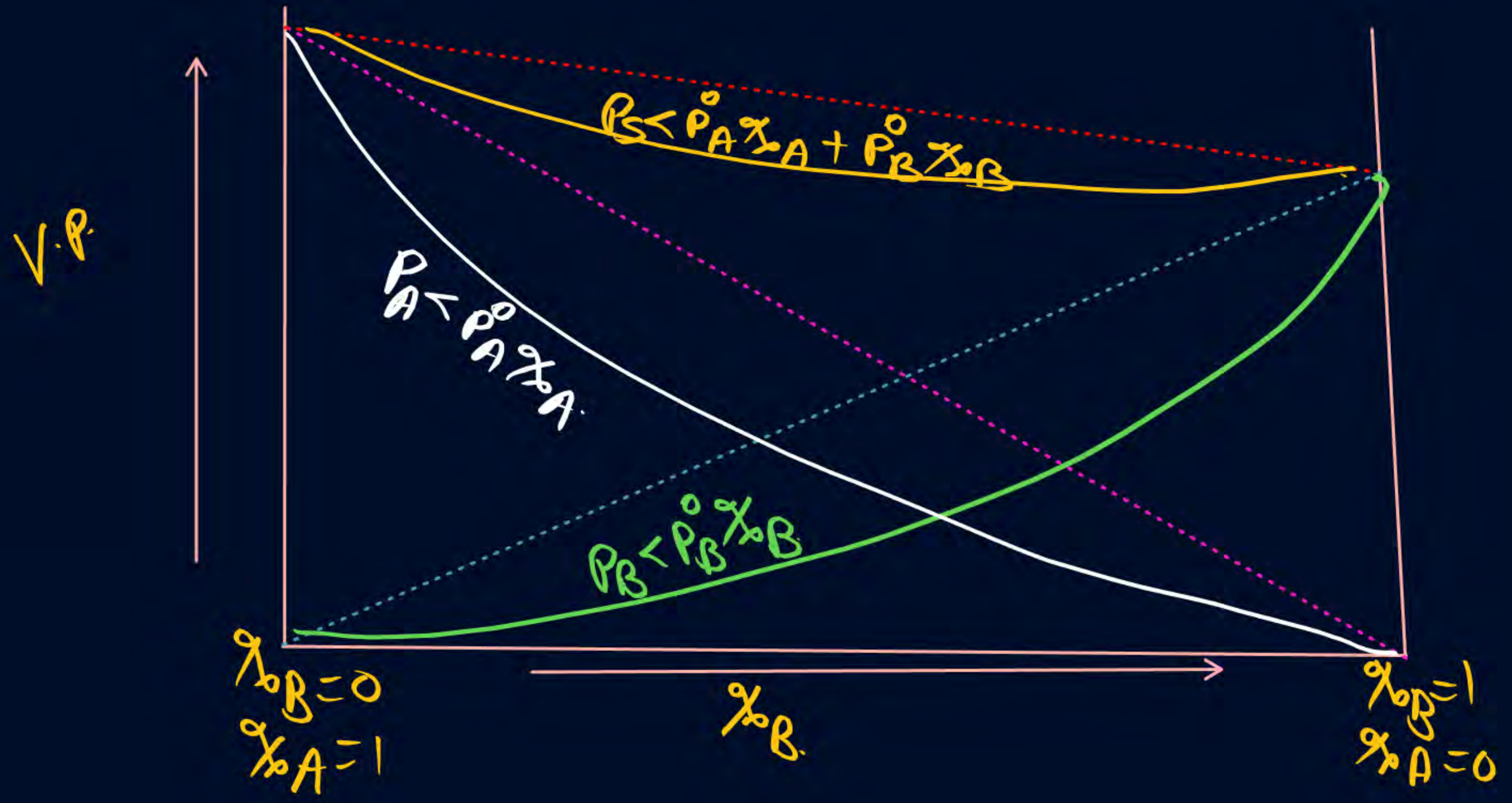
② $\Delta G_{mix.} = (-)ve$ ⎫
③ $\Delta S_{mix.} = (+)ve$ ⎭ → Spontaneous

④ $\Delta V_{mix.} = (-)ve$

⑤ $\Delta H_{mix.} = (-)ve$ · exothermic Heat released T↑

⑥ $\Delta P = P_{observed} - P_{calculated} = (-)ve$

Graphical Representation of Negative deviation



Positive deviation examples

1. alcohol + H_2O
   $CH_3OH + H_2O$
   $C_2H_5OH + H_2O$
2. Acetone + alcohol
3. Acetone + Benzene
4. Acetone + CS_2
5. $CHCl_3 + CCl_4$

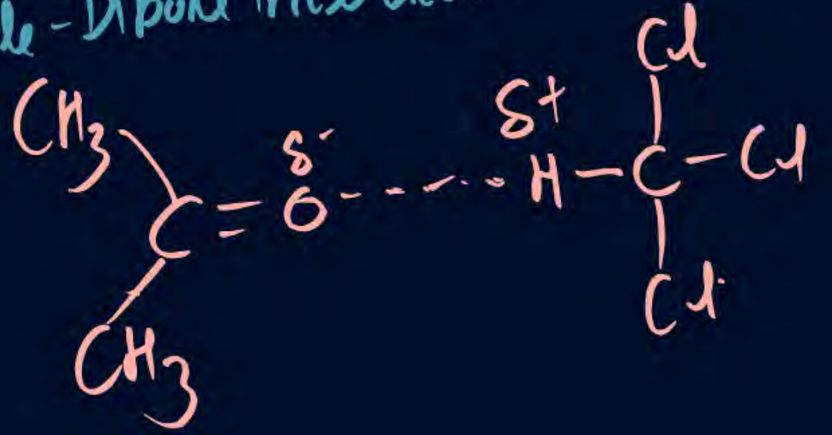
$C_2H_5OH + H_2O \rightarrow C_2H_5OH \cdots H_2O$

H-Bond strong. H Bond weak

Negative deviation examples

1. acid + H_2O
   $HCl + H_2O$
   $HNO_3 + H_2O$
2. acid + Base
   CH_3COOH + Pyridine
   CH_3COOH + Aniline
3. Acetone + $CHCl_3$ → Acetone ⋯ $CHCl_3$ (H-Bond)

Dipole - Dipole interaction



QUESTION – (NEET 2020)

The mixture which shows positive deviation from Raoult's law is:

(A) Benzene + Toluene

(B) Acetone + Chloroform

(C) Chloroethane + Bromoethane

(D) Ethanol + Acetone

QUESTION – (NCERT Exemplar)

Considering the formation, breaking and strength of hydrogen bond, predict which of the following mixtures will show a positive deviation from Raoult's law?

A. Methanol and acetone

B. Chloroform and acetone

C. Nitric acid and water

D. Phenol and aniline

QUESTION – (NCERT Exemplar)

On the basis of information given below mark the correct option.

Information:

(A) In bromoethane and chloroethane mixture intermolecular interactions of A–A and B–B type are nearly same as A–B type interactions.

(B) In ethanol and acetone mixture A–A or B–B type intermolecular interactions are stronger than A–B type interactions.

(C) In chloroform and acetone mixture A–A or B–B type intermolecular interactions are weaker than A–B type interactions.

A. Solution (B) and (C) will follow Raoult's law.

B. Solution (A) will follow Raoult's law.

C. Solution (B) will show negative deviation from Raoult's law.

D. Solution (C) will show positive deviation from Raoult's law.

QUESTION (JEE Main 2009)

A binary liquid solution is prepared by mixing n-heptane and ethanol. Which one of the following statements is correct regarding the behaviour of the solution?

(A) The solution formed is an ideal solution.

(B) The solution is non-ideal, showing +ve deviation from Raoult's law.

(C) The solution is non-ideal, showing –ve deviation from Raoult's law

(D) n-heptane shows +ve deviation while ethanol shows –ve deviation from Raoult's law

QUESTION (JEE Main 2004)

Which of the following liquid pairs shows a positive deviation from Raoult's law?

A. Water – hydrochloric acid

B. Benzene – methanol

C. Water – nitric acid

D. Acetone - chloroform

QUESTION – (AIIMS 2009)

An aqueous solution of hydrochloric acid:

HCl + water

(A) Obeys Raoult's law

(B) Show negative deviation from Raoult's law

(C) Show positive deviation from Raoult's law

(D) Obeys Henry's law at all compositions

QUESTION (JEE Main 2003)

If liquids A and B form an ideal solution, the

$\Delta H_{mix.} = 0$

(A) Enthalpy of mixing is zero ✓

(B) Entropy of mixing is zero ✗

(C) Free energy of mixing is zero ✗

(D) Free energy as well as the entropy of mixing are each zero ✗

Home work from modules

Solve all questions of Ideal solutions & Non-Ideal solutions

Magarmach Practice Questions (MPQ)

attempt after Sunday test.

↓

Lec-1 to Lec-6 Solution first revise then attempt these question.

QUESTION (JEE MAINS 29th July, 1st shift-2022)

If O_2 gas is bubbled through water at 303 K, the number of millimoles of O_2 gas that dissolve in 1 litre of water is _____. (Nearest integer)

(Given: Henry's Law constant for O_2 at 303 K is 46.82 kbar and partial pressure of O_2 = 0.920 bar)

(Assume solubility of O_2 in water is too small, nearly negligible)

QUESTION

Ratio of solubilities of gases N_2 and O_2 in water from air at 25° and 1 atm will be if air is 20% by volume of O_2 and 80% by volume of N_2. Given: $K_H(N_2) = 2 \times 10^4$ atm; $K_H(O_2) = 10^4$ atm

A) 8 : 1

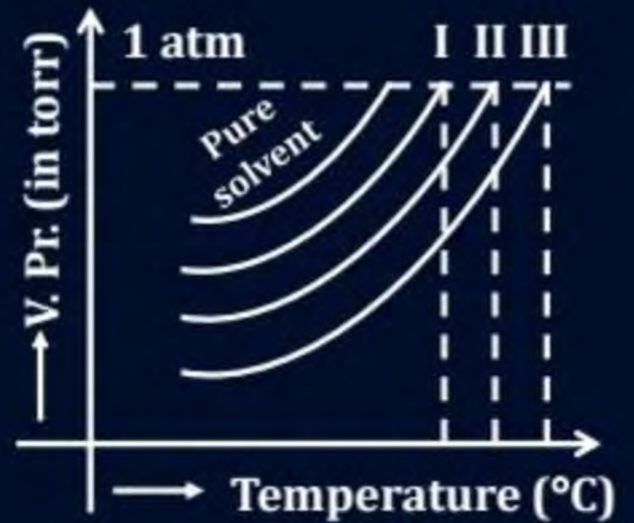
B) 1 : 8

C) 2 : 1

D) 1 : 2

QUESTION

The vapor pressure curves of the same solute in the same solvent are shown. The curves are parallel to each other and do not intersect. The concentrations of solutions are in order of:



(A) I < II < III

(B) I = II = III

(C) I > II > III

(D) I > III > II

QUESTION

A cylinder fitted with a movable piston contains liquid water is equilibrium with water vapor pressure at 25°C. Which of the following operation results in a decrease in the equilibrium vapour pressure at 25°C?

A. Moving the piston downward a short distance

B. Removing a small amount of vapor

C. Removing a small amount of liquid water

D. Dissolving some salt in the water

QUESTION

Which one is not equal to zero for an ideal solution?

A $\Delta P = P_{observed} - P_{raoult}$

B ΔH_{mix}

C ΔS_{mix}

D ΔV_{mix}

QUESTION

The V.P. of pure liquids A and B are 450 and 700 mm of Hg. Find out composition of liquid mixture if total vapour pressure is 600 mm of Hg. Find composition of vapour phase

QUESTION (8th April, 1st shift-2019)

The vapour pressures of pure liquids A and B are 400 and 600 mm Hg, respectively at 298 K. On mixing the two liquids, the sum of their initial volumes is equal to the volume of the final mixture. The mole fraction of liquid B is 0.5 in the mixture. The vapour pressure of the final solution, the mole fractions of components A and B in vapour phase, respectively are:

(A) 450 mm Hg, 0.5, 0.5

(B) 450 mm Hg, 0.4, 0.6

(C) 500 mm Hg, 0.5, 0.5

(D) 500 mm Hg, 0.4, 0.6

QUESTION (JEE Main 2005)

Benzene and toluene form nearly ideal solutions. At 20°C, the vapour pressure of benzene is 75 torr and that of toluene is 22 torr. The partial vapour pressure of benzene at 20°C for a solution containing 78 g of benzene and 46 g of toluene in torr is: (molar mass of benzene & toluene is 78 g & 92 g)

A. 50

B. 25

C. 37.5

D. 53.5

QUESTION (JEE Main 2008)

At 80°C, the vapour pressure of pure liquid A is 520 mm of Hg and that of pure liquid B is 1000 mm of Hg. If a mixture solution of A and B boils at 80°C and 1 atm pressure, the amount of A in the mixture is (1 atm = 760 mm of Hg)

A. 50 mol percent

B. 52 mol percent

C. 34 mol percent

D. 48 mol percent

QUESTION (Online 2015)

A solution at 20°C is composed to 1.5 mol of benzene and 3.5 mol of toluene. If the vapour pressure of pure benzene and pure toluene at this temperature are 74.7 torr and 22.3 torr, respectively, then the total vapour pressure of the solution and the benzene mole fraction in equilibrium with it will be, respectively.

(A) 35.0 torr and 0.480

(B) 38.0 torr and 0.589

(C) 30.5 torr and 0.389

(D) 35.8 torr and 0.280

QUESTION (10th Jan, 1st shift-2019)

Liquids A and B form an ideal solution in the entire composition range. At 350 K, the vapour pressures of pure A and pure B are 7×10^3 Pa and 12×10^3 Pa, respectively. The composition of the vapour in equilibrium with a solution containing 40 mole percent of A at this temperature is:

(A) $x_A = 0.4; x_B = 0.6$

(B) $x_A = 0.28; x_B = 0.70$

(C) $x_A = 0.37; x_B = 0.63$

(D) $x_A = 0.76; x_B = 0.24$

QUESTION (JEE Main 2010)

On mixing, heptane and octane form an ideal solution. At 373 K, the vapour pressure of the two liquid components (heptane and octane) are 105 kPa and 45 kPa respectively. Vapour pressure of the solution obtained by mixing 25.0 g of heptane and 35 g of octane will be (molar mass of heptane = 100 g mol^{-1} and of octane = 114 g mol^{-1})

A. 144.5 kPa

B. 72.0 kPa

C. 36.1 kPa

D. 96.2 kPa

QUESTION (JEE Main 2007)

A mixture of ethyl alcohol and propyl alcohol has a vapour pressure of 290 mm at 300 K. The vapour pressure of propyl alcohol is 200 nm. If the mole fraction of ethyl alcohol is 0.6, its vapour pressure (in mm) at the same temperature will be:

A 360

B 350

C 300

D 700

QUESTION (JEE Main 2003)

If liquids A and B form an ideal solution, the

A. Enthalpy of mixing is zero

B. Entropy of mixing is zero

C. Free energy of mixing is zero

D. Free energy as well as the entropy of mixing are each zero

QUESTION (28th July 2nd Shift-2022)

A gaseous mixture of two substances A and B, under a total pressure of 0.8 atm is in equilibrium with an ideal liquid solution. The mole fraction of substance A is 0.5 in the vapour phase and 0.2 in the liquid phase. The vapour pressure of pure liquid A is _____ atm. (Nearest integer)

QUESTION (28th June 1st Shift-2022)

The vapour pressure of two volatile liquids A and B at 25°C are 50 torr and 100 torr, respectively. If the liquid mixture contains 0.3 mole fraction of A, then the mole fraction of liquid B in the vapour phase is $x/17$. The value of x is ____.

QUESTION (20th July 1st Shift-2021)

At 20°C, the vapour pressure of benzene is 70 torr and that of methyl benzene is 20 torr. The mole fraction of benzene in the vapour phase at 20°C above an equimolar mixture of benzene and methyl benzene is ___ $\times 10^{-2}$. (Nearest integer)

QUESTION (20th July 2nd Shift-2021)

The vapour pressure of A and B at 25°C are 90 mm Hg and 15 mm Hg respectively. If A and B are mixed such that the mole fraction of A in the mixture is 0.6, then the mole fraction of B in the vapour phase is $x \times 10^{-1}$. The value of x is ____. (Nearest integer)

QUESTION (16th March 2nd Shift-2021)

At 363 K, the vapour pressure of A is 21 kPa and that of B is 18 kPa. One mole of A and 2 moles of B are mixed. Assuming that this solution is ideal, the vapour pressure of the mixture is _____ kPa. (Round off to the Nearest integer)

Combined questions ⇒ Blank Pdf ⇒ Some basic Concepts of Chem.
↓ +
Class objective questions + MPQ question. Redox Reactions

THANK YOU