YAKEEN NEET 2.0

2026

Some Basic Concept of Chemistry

Physical Chemistry | Lecture -12

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Topics to be covered

1. Revision of Last Class
2. Concentration terms
3. Equivalent Mass
4. ★★★★★ Trick
5. Magarmach Practice Questions (MPQ) & 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 !!!

Revision of Last class

$$M = \frac{n_B}{V(L)} \quad | \quad F = \frac{n_B}{V(L)}$$

$$m = \frac{n_B}{W_A(\text{in kg})}$$

$$\chi_B = \frac{n_B}{n_A + n_B}$$

$$\chi_A = \frac{n_A}{n_A + n_B}$$

$$\frac{\chi_B}{\chi_A} = \frac{n_B}{n_A}$$

$$\chi_A + \chi_B = 1$$

$$m = \frac{\chi_B \times 1000}{\chi_A \times M_A}$$

Relation Between Mole Fraction (x) & Molarity (M)

$$M = \frac{n_B}{V(L)} = \frac{n_B \times n_A}{n_A \times V(L)}$$

#MIT

$$M = \frac{\chi_B \times n_A}{\chi_A \times V(L)}$$

Question

If in an aqueous solution $X_B = 0.3$ and moles of water is 21 in 3L, find molarity?

$M = ?$

$x_B = 0.3$

$x_A = 1 - x_B$

$= 1 - 0.3 = 0.7$

$M = \frac{x_B \times n_A}{x_A \times V(L)}$

$= \frac{0.3 \times 21}{0.7 \times 3} = 3M$

$n_A = 21$

$V(L) = 3L$

Relation between Molarity (M), Molality (m) and Density of Solution (d) (g/ml)

#mIT

$$M = \frac{1000md}{1000 + mM_B}$$

d = density of sol^n (g/ml)

Question

An aqueous solution of ethanol (C_2H_5OH) has density 1.025 g/mL and it is 2 M. What is the molality of this solution?

(Molar mass of ethanol = 46 g)

1. 1.79
2. 2.143
3. 1.951
4. None of these

$d = 1.025\ g/ml$

$M = 2M \rightarrow$ 2 moles solute present in 1000 ml solution.

$n_B = 2$

$w_B = 2 \times 46 = 92\ g$

$m = \frac{n_B}{w_A(\text{in kg})} = \frac{2 \times 1000}{933} = \frac{2000}{933}$

$W = 1000 \times 1.025$

$= 1025\ g = w_A + w_B$

$1025 = w_A + 92$

$w_A = 933\ g$

$$M = \frac{1000\,md}{1000 + m M_B}$$

$$2 = \frac{1000\,m \times 1.025}{1000 + m \times 46}$$

$$2000 + 92m = 1025m$$

$$2000 = 933m$$

$$m = \frac{2000}{933}$$

$$933 \overline{)2000}\ (2.03$$

$$1866$$

$$3400$$

Question

$T^B =$

Molarity and molality of a solution of a liquid (mol. mass = 50) in aqueous solution is 9 and 10 respectively. What is the density of solution?

1. 1 g/cc
2. 0.95 g/cc
3. 1.05 g/cc
4. 1.35 g/cc ✓

$M_B = 50$ g

$M = 9$ M

$d = \frac{W(g)}{V(ml)}$

9 moles solute in 1000 ml soln.

$m = 10$ m

10 moles solute in 1000 g solvent

$1cc = 1cm^3 = 1ml$

$M = \frac{1000md}{1000 + mM_B}$

$9 = \frac{1000 \times 10 \times d}{1000 + 10 \times 50}$

$13500 = 10000d$

$d = \frac{135}{100} = 1.35$ g/ml

Dilution Equation

$\downarrow M = \frac{n_B}{V(L)\uparrow T}$ | $M_1V_1 = n_B$ | $M_2V_2 = n_B$

#JEE

(1) dilution → solvent ↑ ⇒ V ↑ ⇒ M ↓

but n_B remains same

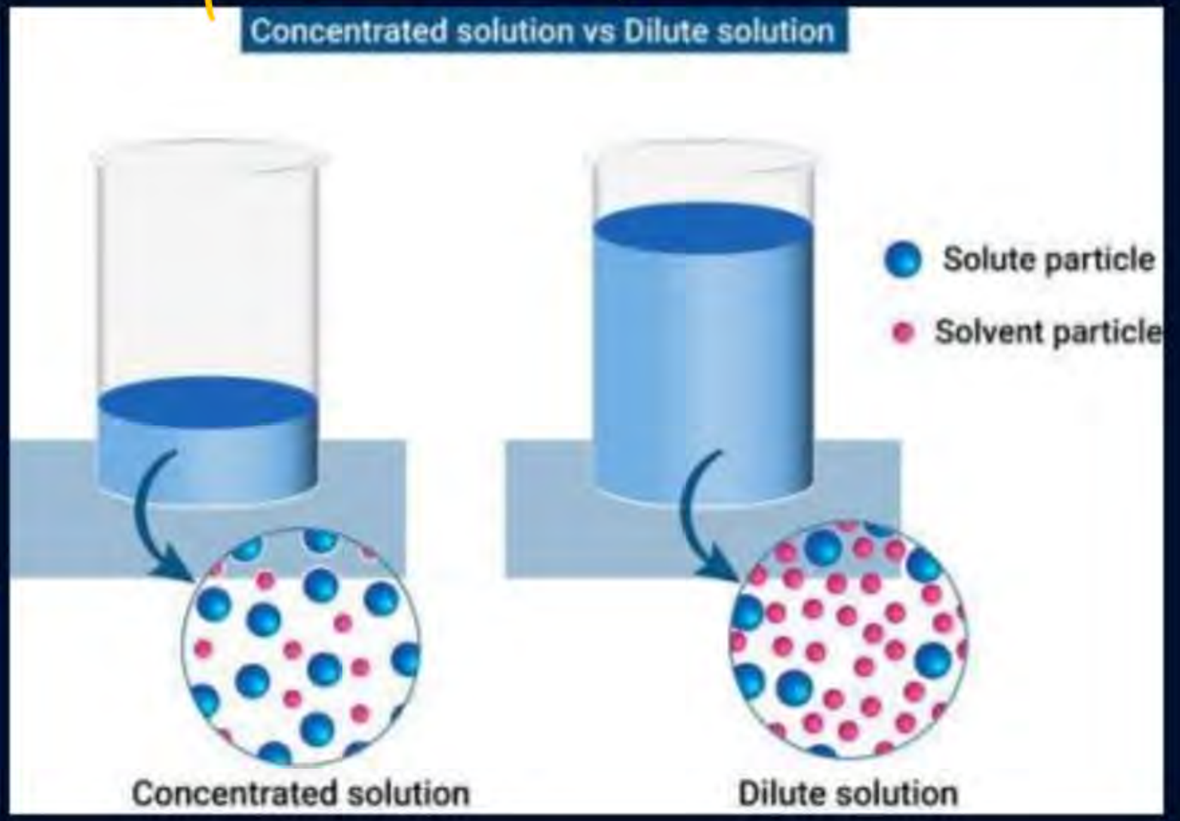
(2) $M_1V_1 = M_2V_2$

Conc. soln — M_1, V_1 — Stock soln.

dilute soln. — M_2, V_2

$M_1 > M_2$

$V_1 < V_2$



Question

Find volume of 6 M HCl which is required to prepare 500 mL of 3 M HCl?

Ans $V_1 = ?$ $V_2 = 500ml$

$M_1 = 6M$ $M_2 = 3M$

$M_1V_1 = M_2V_2$

$V_1 = \frac{M_2V_2}{M_1} = \frac{3 \times 500}{6} = 250ml$

Relation b/w % by mass (w/w), d of soln (d in g/ml) & Molarity (M)

#MIT

$$M = \frac{\%\text{ by mass} \times d \times 10}{M_B}$$

$M_B = 36.5\ g$

Q. Find M of soln which is 73% by mass of HCl & has density of soln 2 g/ml?

Ans $M = \frac{n_B}{V(L)}$

$= \frac{2 \times 20}{1} = 40M$

73 g of HCl present in 100 g of soln

$n_B = \frac{73}{36.5} = 2$

$M = \frac{73 \times 2 \times 10}{36.5} = 40M$

$\text{mass} = V \times d$

$V(ml) = \frac{100}{2} = 50ml$

$= \frac{50}{1000} L$

$= \frac{1}{20} L$

Question

29.2% (w/w) HCl stock solution has a density of 1.25 g mL^{-1}. The molecular weight of HCl is 36.5 g mol^{-1}. The volume (mL) of stock solution required to prepare a 200 mL solution of 0.4 M HCl is

Conc. soln
29.2% by mass
$d = 1.25\ g/ml$
$M_B = 36.5\ g/ml$

$V_1(ml) = ?$

$$M_1 = \frac{29.2 \times 1.25 \times 10}{36.5 \times 10}$$

dil. soln
$V_2 = 200ml$
$M_2 = 0.4\ M$

$M_1V_1 = M_2V_2$

$$V_1 = \frac{0.4 \times 200}{M_1}\ ml$$

Parts per Million (ppm)

#M17

1 million $= 10^6$

$ppm = \frac{\text{parts solute}}{\text{parts solution}} \times 10^6$

ppm → parts of solute in 10^6 parts of solution

15 ppm by mass ⇒ 15 g ~~~~~ g ~~~~~

15 ppm by volume → 15 ml ~~~~~ ml ~~~~~

15 ppm by strength → 15 g ~~~~~ ml ~~~~~

ppb = parts per billion.

parts solute in 10^9 parts of solution.

$$ppb = \frac{\text{parts solute}}{\text{solution}} \times 10^9$$

1 billion = 10^9

ppt = parts per thousand

$$ppt = \frac{\text{parts solute}}{\text{solution}} \times 10^3$$

Q: If 12 ppt by mass is present then find mass solute & mass solution.

Ans 12 g of solute in 1000 g of soln.

Q: If 20 g of solute present in 200 g of solution. find ppm

Ans $ppm = \frac{20}{20} \times 10^6 = 10^5$

$\frac{20}{10}$

Question

If 15 ppm of $CaCO_3$ is present in 1 kg of water solution.

Find mass of $CaCO_3$ in g.

Ans 15 g of solute present in 10^6 g of soln.

$10^3 \times \frac{15}{10^6}$ ——— 10^3 g ———

$= 0.015$ g

#

M.T

Solute $\Rightarrow$ $A_2B_3 \longrightarrow 2A^{3+} + 3B^{2-}$

$M_{A_2B_3} = x\,M$

$M_{A^{3+}} = 2 \times x\,M$ | $M_{B^{2-}} = 3x\,M$

Question

What is molarity of K^+ in aqueous solution that contains 17.4 ppm of K_2SO_4 ($174\ g\ mol^{-1}$)?

1. 2×10^{-2} M
2. 2×10^{-3} M
3. 4×10^{-4} M
4. 2×10^{-4} M ✓

↑ solvent → H_2O → A

↑ solute

17.4 g of solute in 10^6 g of soln.

$$M_{K_2SO_4} = \frac{n_B}{V(L)}$$

$$= \frac{0.1}{10^3} = 10^{-4}\ M$$

$K_2SO_4 \rightarrow 2K^+ + 1SO_4^{2-}$

10^{-4} M | 2×10^{-4} M | 10^{-4} M

$$n_B = \frac{17.4}{174} = 0.1\ mol$$

$10^6 = V(ml) \times d\ (g/ml)$

$10^6\ ml = V(ml) \times 1$

$$V(L) = \frac{10^6}{1000} = 10^3\ L$$

$$= \frac{1000000}{1000} = 10 \times 10 \times 10 = 10^{(1+1+1)} = 10^3$$

Equivalent Mass (E)

Mass substance
- react
- produce
- displace

E

✓ 1g of Hydrogen
or
✓ 8g of oxygen
or
✓ 35.5g of Chlorine
or
✓ 50g of $CaCO_3$

Q. $\underset{12g}{1C} + \underset{4g}{2H_2} \longrightarrow \underset{16g}{1CH_4}$

$12g \leftarrow 4g \longrightarrow 16g$

$3g = \frac{12}{4} \leftarrow 1g \longrightarrow \frac{16}{4} = 4g$ is eq. mass of CH_4 in this rxn

↓

Eq. mass of C in this rxn

$AB + C \rightarrow BC + A$

Q. $\underset{65g}{1Zn} + \underset{36.5g}{2HCl} \rightarrow \underset{136g}{1ZnCl_2} + \underset{2g}{1H_2(g)}$

$H_2(g): 2g \rightarrow 65g$

$1g \rightarrow \frac{65}{2} = 32.5g$

$2g \rightarrow 73g$

$1g \rightarrow \frac{73}{2} = 36.5g$

$136g \leftarrow 2g$

$68g = \frac{136}{2} \leftarrow 1g$

Q. $\underset{12g}{C} + \underset{32g}{O_2} \rightarrow \underset{44g}{CO_2}$

$12g \leftarrow 32g \rightarrow 44g$

$\frac{12}{32} \leftarrow 1g \rightarrow \frac{44}{32}$

$3g\ 8 \times \frac{12}{32} \leftarrow 8g \rightarrow \frac{44}{32} \times 8 = 11g$ eq. mass CO_2 in this rxn.

↓

eq. mass of C in rxn. $= 4$

Q =

16g	32g	44g	18g
$1CH_4$	$+ 2O_2$	$\longrightarrow 1CO_2$	$+ 2H_2O$

16g ← 64g ⟶ 44g ⟶ 36g

$2g = 8 \times \frac{16}{64_8}$ ← 8g ⟶ $\frac{44 \times 8}{64_8}$

$= \frac{11}{2}g$

$\frac{36}{64_8} \times 8 = \frac{9}{2} = 4.5g$

★★★★★ Trick

Overthinking → Appointment → Time fix → 9 p.m.
↓
15 min.

Magarmach Practice Questions (MPQ)

Question (NCERT: PL-23 | JEE Main Jan. 22, 2025 (II))

20 mL of 2 M NaOH solution is added to 400 mL of 0.5 M NaOH solution. The final concentration of the solution is _____ $\times 10^{-2}$ M. (Nearest integer)

Question (NCERT: PL-18 | NV, JEE Main July 26, 2022 (I)

Chlorophyll extracted from the crushed green leaves was dissolved in water to make 2 L solution of Mg of concentration 48 ppm. The number of atoms of Mg in this solution is $x \times 10^{20}$ atoms. The value of x is _____. (Nearest Integer)
(Given : Atomic mass of Mg is 24 g mol^{-1}; $N_A = 6.02 \times 10^{23}$ mol^{-1})

Question (NCERT: PL-23 | Online JEE Main April 09, 2014)

Dissolving 120 g of a compound of mol. wt. 60 in 1000 g of water gave a solution of density 1.12 g/mL. The molarity of the solution is :

(A) 1.00 M

(B) 2.00 M

(C) 2.50 M

(D) 4.00 M

Question (NCERT: PL-20 | JEE Main April 02, 2025 (I))

$CaCO_3(s) + 2HCl(aq) \rightarrow CaCl_2(aq) + CO_2(g)\ H_2O(l)$

Consider the above reaction, what mass of $CaCl_2$ will be formed if 250 mL of 0.76 M HCl reacts with 1000 g of $CaCO_3$?

(Given : Molar mass of Ca, C, O, H and Cl are 40, 12, 16, 1 and 35.5 g mol^{-1}, respectively)

(A) 3.908 g

(B) 2.636 g

(C) 10.545 g

(D) 5.272 g

Question (NCERT: PL-23 | JEE Main Jan. 28, 2025 (II))

Concentrated nitric acid is labelled as 75% by mass. The volume in mL of the solution which contains 30 g of nitric acid is _____.
Given : Density of nitric acid solution is 1.25 g/mL

(A) 45

(B) 55

(C) 32

(D) 40

Question (NCERT: PL-20 | NV, JEE Main Jan. 28, 2025 (I))

The moalrity of a 70% (mass/mass) aqueous solution of a monobasic acid (X) is _____ $\times 10^{-1}$ M (Nearest integer)

[Given : Density of aqueous solution of (X) is 1.25 g mL^{-1} Molar mass of the acid is 70 g mol^{-1}]

Question (NCERT: PL-23 | JEE Main Jan. 22, 2025 (I))

Density of 3 M NaCl solution is 1.25 g/mL. The molality of the solution is :

(A) 1.79 m

(B) 2 m

(C) 3 m

(D) 2.79 m

QUESTION [JEE MAINS 9 Apr. 2019 (Shift-II)]

What would be the molality of 20% (mass/mass) aqueous solution of KI? (molar mass of KI = 166 g mol^{-1})

1. 1.51
2. 1.08
3. 1.48
4. 1.35

QUESTION – (AIIMS 2019)

The empirical formula of the compound if M = 68% (atomic mass = 34) and remaining 32% oxygen is?

(A) MO

(B) M_2O

(C) MO_2

(D) M_2O_3

QUESTION – (AIIMS 2019)

Which one of the following is the lightest?

(A) 0.2 mole of hydrogen gas

(B) 6.023×10^{22} molecules of nitrogen

(C) 0.1 g of silver

(D) 0.1 mole of oxygen gas

QUESTION – (AIIMS 2017)

Assertion: Equal moles of different substances contain same number of constituent particles.

Reason: Equal weights of different substance contain the same number of constituent particles

(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.

QUESTION – (AIIMS 2018, 2013, 2011)

Assertion: The normality of 0.3 M aqueous solution of H_3PO_3 is equal to 0.6 N.

Reason: Equivalent weight of $H_3PO_3 = \frac{\text{Molecular weight of } H_3PO_3}{3}$

(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.

QUESTION – (AIIMS 2018 (E), 26 May)

A binary mixture of bivalent metals having mass 2 g, molecular mass of A and B are 15 and 30 respectively, is dissolved in HCl, it evolves 2.24 L H_2 at STP, what is the mass of A present in mixture?

(A) 1 g

(B) 1.5 g

(C) 0.5 g

(D) 0.75 g

QUESTION – (AIIMS 2017)

Volume of water needed to mix with 10 mL 10 N HNO_3 to get 0.1 N HNO_3 is:

A 1000 mL

B 990 mL

C 1010 mL

D 10 mL

QUESTION – (AIIMS 2016)

Arrange the following in the order of increasing mass (atomic mass : O = 16, Cu = 63, N = 14)

I. one atom of oxygen

II. one atom of nitrogen

III. 1×10^{-10} mole of oxygen

IV. 1×10^{-10} mole of copper

(A) II < I < III < IV

(B) I < II < III < IV

(C) III < II < IV < I

(D) IV < II < III < I

QUESTION – (AIIMS 2014)

Which has the maximum number of molecules among the following

(A) 44 g CO_2

(B) 48 g O_3

(C) 8 g H_2

(D) 64 g SO_2

QUESTION – (AIIMS 2013)

$KMnO_4$ reacts with oxalic acid according to the equation:

$$2MnO_4^- + 5C_2O_4^{2-} + 16H^+ \longrightarrow 2Mn^{2+} + 10CO_2 + 8H_2O$$

Here 20 mL of 0.1 M $KMnO_4$ is equivalent to:

(A) 20 mL of 0.5 M $H_2C_2O_4$

(B) 50 mL of 0.5 M $H_2C_2O_4$

(C) 50 mL of 0.1 M $H_2C_2O_4$

(D) 20 mL of 0.1 M $H_2C_2O_4$

QUESTION – (AIIMS 2013)

An aqueous solution of 6.3 g of oxalic acid dihydrate is made up to 250 mL. The volume of 0.1 N NaOH required to completely neutralize 10 mL of this solution is:

(A) 20 mL

(B) 40 mL

(C) 10 mL

(D) 4 mL

QUESTION – (AIIMS 2012)

In a hydrogen, mass ratio of hydrogen and carbon is 1 : 3, the empirical formula of hydrocarbon is:

(A) CH_4

(B) CH_2

(C) C_2H

(D) CH_3

QUESTION – (AIIMS 2012)

For preparing 0.1 N solution of a compound from its impure sample of which the percentage purity is known, the weight of the substance required will be

A less than the theoretical weight

B more than the theoretical weight

C same as the theoretical weight

D none of these

QUESTION – (AIIMS 2010)

A solution is prepared by dissolving 24.5 g of sodium hydroxide in distilled water to give 1 L solution. The molarity of NaOH in the solution is:

(A) 0.2450 M

(B) 0.6125 M

(C) 0.9800 M

(D) 1.6326 M

(Give that molar mass of NaOH = 40.0 g mol^{-1})

QUESTION – (AIIMS 2010)

The reaction of calcium with water is represented by the equation:

$$Ca + 2H_2O \rightarrow Ca(OH)_2 + H_2$$

What volume of H_2 at STP would be liberated when 8 g of calcium completely reacts with water?

(A) $0.2\ cm^3$

(B) $0.4\ cm^3$

(C) $2240\ cm^3$

(D) $4480\ cm^3$

QUESTION – (AIIMS 2008)

Assertion: One molal aqueous solution of glucose contains 180 g of glucose in 1 kg water.

Reason: Solution containing one mole of solute in 1000 g of solvent is called one molal solution.

(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.

QUESTION – (AIIMS 2008)

Assertion: Equivalent weight of a base = $\frac{\text{Molecular weight}}{\text{Acidity}}$

Reason: Acidity is the number of replaceable hydrogen atoms in one molecule of the base.

(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.

QUESTION – (AIIMS 2008)

During electrolysis of water the volume of O_2 liberated is 2.24 dm^3. The volume of hydrogen liberated, under same conditions will be

(A) 2.24 dm^3

(B) 1.12 dm^3

(C) 4.48 dm^3

(D) 0.56 dm^3

QUESTION – (AIIMS 2002)

Assertion: **Atoms can neither be created nor destroyed.**
Reason: **Under similar condition of temperature and pressure, equal volume of gases does not contain equal number of atoms.**

(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 2002)

The weight of one molecule of a compound of molecular formula $C_{60}H_{122}$ is:

A 1.2×10^{-20} g

B 5.025×10^{23} g

C 1.4×10^{-21} g

D 6.023×10^{-20} g

THANK YOU