# YAKEEN NEET 2.0

2026

## Some Basic Concept of Chemistry

Physical Chemistry | Lecture -14

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# Topics to be covered

1. Revision of Last Class
2. Law of Equivalence
3. Concentration of Mixtures
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 !!!

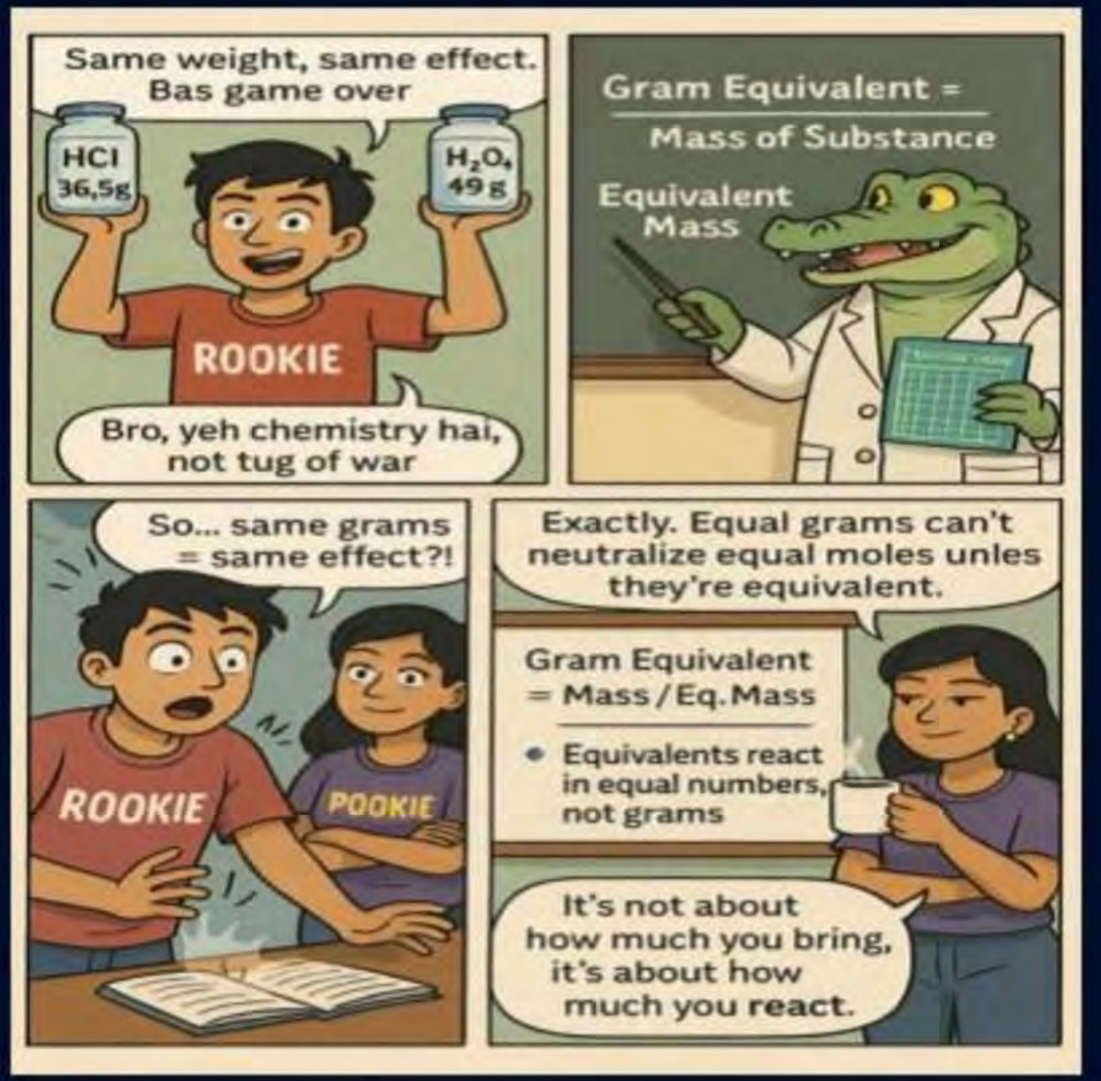
# Revision of Last class

$$\text{Eq. Mass} = \frac{\text{Gr. M. M.}}{n_f}$$

- Acid → no. of $H^+$
- Base → no. of $OH^-$
- ion → |Charge|
- element → |Valency|
- ionic Cmpd → Charge of Cation or Anion

# Gram Equivalent

$$g.eq. = \frac{\text{Mass}}{\text{eq. mass}}$$



# Normality ( N )

$$N = \frac{\text{g. eq of solute}}{V(L)}$$

g eq/L or Normal or N

$$N = M \times n_{factor}$$

# effect of Temp. on Conc. terms.

1M or 1m ✓

1M or 1m → more Conc.

aq. soln.

✓ 1M → 1 mole → 1000ml soln.
1000g solution

1m → 1 mole → 1000g solution.

Non-aq. soln

d < 1g/ml

1M more Conc.

d > 1g/ml.

2 cases

1M more Conc.

1m more Conc.

# All formulas of Gram Equivalents

#MIT

WE in VaN with VoMeN & MeN

$g.eq. = \frac{\text{weight}}{\text{eq. wt.}} = V(L) \times N = V(L) \times M \times n_f = \text{moles} \times n_f$

$N = \frac{g.eq.}{V(L)}$ $\quad N = M \times n_f$

$g.eq. = \frac{w}{E} = \left(\frac{w}{M}\right) \times n_f$

$g.eq. = \text{moles} \times n_f$

# Law of Equivalence

#MFT

(1) g·eq reacted = g eq produced
each reactant of each product

(2) L.R. → g·eq least

5 − 4 = 1 g·eq

4 g·eq 4 g eq

$1H_2(g) + 1Cl_2(g) \rightarrow 2HCl(g)$

g eq of $H_2$ react = g eq of $Cl_2$ react = g eq of HCl produce

$1N_2(g) + 3H_2(g) \rightarrow 2NH_3(g)$

g eq of $N_2$ reacted = g eq of $H_2$ reacted = g eq of $NH_3$ produced

(3) g·eq Cmpd = g·eq particles

$$1\,NaCl \rightarrow 1\,Na^{+} + 1\,Cl^{-}$$

$$\text{geq } NaCl = \text{geq of } Na^{+} = \text{geq of } Cl^{-}$$

$$1\,H_2SO_4 \rightarrow 2\,H^{+} + 1\,SO_4^{2-}$$

$$\text{geq of } H_2SO_4 = \text{geq } H^{+} = \text{geq of } SO_4^{2-}$$

1 Boy + 1 Girl → 1 Marriage

| Boys | Girls | Marriages |
|---|---|---|
| 50 | 80 | 50 |
| 60 | 40 | 40 |
| 100 | 100 | 100 |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

QUESTION

If metal oxide has 60 % oxygen. Find equivalent mass of metal?

$E_{O_2} = 8$ g

100g

$M_xO_y$ $\quad E_M = ?$

60% oxygen.

Mass of $O_2 = \frac{60}{100} \times 100 = 60$g.

Mass of metal $= 100 - 60 = 40$g.

Metal + oxygen $\rightarrow M_xO_y$

g eq of metal = g eq of oxygen

$$\frac{40}{E_M} = \frac{60}{8}$$

$$E_M = \frac{16}{3} = 5.33\text{g}$$

Q If metal is put in air & it's mass inc. by 24%. find eq. mass of metal?

A

Metal + oxygen (air) → metal oxide

let 100g + 24g = 124g

$$\frac{100}{E_m} = \frac{24}{8}$$

$$E_m = \frac{100}{3} = 33.33\,g$$

QUESTION

**If metal chloride has 29 % Metal. find equivalent mass of metal?**

71 % Chlorine

$$g_{eq}\ M = g_{eq}\ Cl_2$$

$$\frac{29}{E_m} = \frac{71}{35.5}^{2}$$

$$E_m = \frac{29}{2} = 14.5\ g$$

QUESTION

**If 80 g of Calcium reacts with excess of oxygen. Find mass of CaO formed.**

Ans

$Ca + O_2 \rightarrow CaO$

$\frac{80}{E_{Ca}} = \frac{w_{CaO}}{E_{CaO}}$

$\frac{80}{20} = \frac{w_{CaO}}{28}$

$w_{CaO} = 112\,g$

HO (Ca) 16 O

$CaO \rightarrow Ca^{2+} + O^{2-}$

$E_{Ca} = \frac{40}{2} = 20\,g$

$E_{CaO} = \frac{56}{2} = 28$

QUESTION

**If 40 g of $CaCO_3$ is treated with 40 g of HCl, which of the reactants will act as limiting reagent?**

1. $CaCO_3$
2. HCl
3. Both (A) and (B)
4. None of these

$$g\cdot eq\ CaCO_3 = \frac{40}{50} = 0.8$$

$$g\cdot eq\ HCl = \frac{40}{36.5}$$

## Question (NCERT: PL-23 | NV, JEE Main Jan. 29, 2024 (II))

**If 50 mL of 0.5 M oxalic acid is required to neutralize 25 mL of NaOH solution, the amount of NaOH in 50 mL of given NaOH solution is ___4___ g.**

$n_f = 2$

$H_2C_2O_4 + 2NaOH \rightarrow Na_2C_2O_4 + 2H_2O$

(Oxalic acid)

$V(mL) \times M \times n_f = \text{moles} \times n_f$

$\frac{50}{1000} \times \frac{0.5}{10} \times 2 = \frac{W_{NaOH}}{40} \times 1$

$W_{NaOH} = 2\,g$ in 25 ml

$= 4\,g$ in 50 ml.

acid + base → neutralisation

eqn.

## Question (NCERT: PL-20 | NV, JEE Main April 06, 2023 (I))

**If 5 moles of $BaCl_2$ is mixed with 2 moles of $Na_3PO_4$, the maximum number of moles of $Ba_3(PO_4)_2$ formed is _____ (Nearest integer)**

Ans

$$\overset{2+}{Ba}\overset{-}{Cl_2} + \overset{+}{Na_3}\overset{3-}{PO_4} \rightarrow \overset{2+}{Ba_3}(\overset{3-}{PO_4})_2$$

g.e. $5 \times 2$ $\quad 2 \times 3$

g.eq of $Na_3PO_4$ = geq $Ba_3(PO_4)_2$

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

$\text{Moles} = 1$

QUESTION

$^{108}Ag$, $^{35.5}Cl$, $^{23}Na$, $^{14}N$, $^{16}O$

**The weight of AgCl precipitated when a solution containing 5.85 g of NaCl is added to a solution containing 3.4 g of $AgNO_3$ is:**

$w_{AgCl} = ?$

1. 28 g
2. 9.25 g
3. 2.87 g
4. 58 g

$NaCl + AgNO_3 \rightarrow AgCl + NaNO_3$

eq.

$\frac{5.85}{58.5} = 0.1$

$\frac{3.4}{170}$ L.R.

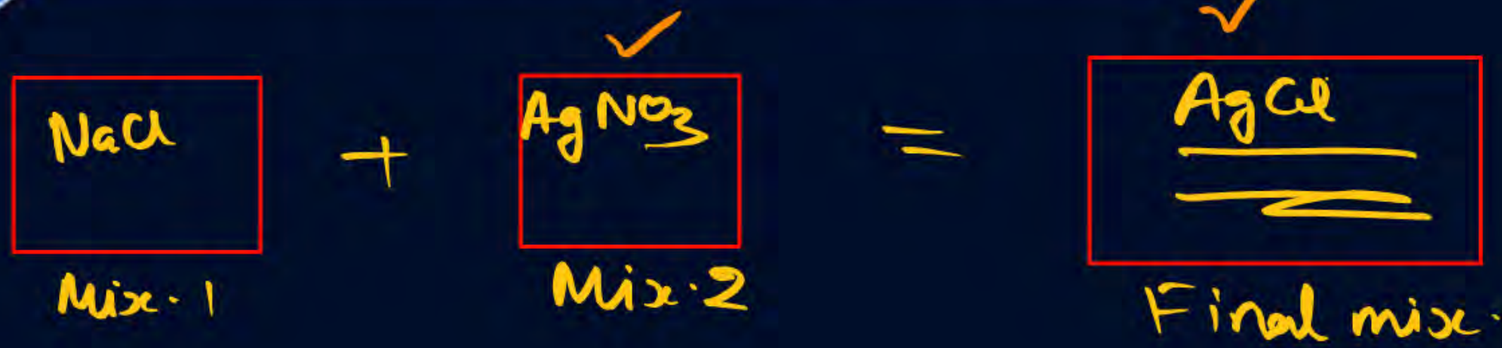
$\frac{3.4}{170} = \frac{w_{AgCl}}{143.5}$

2

$w_{AgCl} = \frac{3.4 \times 143.5}{170 \times 100}$

$= 2.87\,g$

# Concentration of Mixtures



# Concentration of Mixtures If Nature is not Same i.e. They React with Each Other

| Acid | + | Base | ⟶ | |
|---|---|---|---|---|
| 5 | | 3 | | |

geq

# MIT

L.R. $(5-3) = 2$ geq $=$ geq $\underset{\text{acid}}{}$ $\underset{H^+}{}$ Base

$|M_1V_1 - M_2V_2|$

$V_1 + V_2$

① $g\cdot eq\cdot left\left(\underline{H^+} \text{ or } \underline{OH^-}\right) = \left|g_{eq_{acid}} - g_{eq_{base}}\right|$

② $\underline{N_{H^+}} \text{ or } \underline{N_{OH^-}} = \dfrac{g\,eq\,left}{\text{Total Vol.(L)}} = \underline{M_{H^+}} \text{ or } \underline{M_{OH^-}}$

QUESTION

**Find M of $H^+$ in resulting mixture If 5 L of 2 M $H_2SO_4$ is mixed with 10 L of 1 M NaOH?**

Ans geq $H^+$ $= |5 \times 2 \times 2 - 10 \times 1 \times 1|$

$= |20 - 10| = 10$

$N_{H^+} = M_{H^+} = \frac{10}{5+10} = \frac{10}{15} = \frac{2}{3} = 0.66\ M$

QUESTION

Find M of $OH^-$ in resulting solution If 2 L of 5 M NaOH is mixed with 2 L of 1 N $H_2SO_4$?

$V(L) \times N$

$g_{OH^-}$ left $= |2 \times 1 - 2 \times 5 \times 1| = 8$

$N_{OH^-} = \frac{8}{4} = 2\ M = M_{OH^-}$

QUESTION

↑ geq acid > geq base ⇒ acidic soln.
↓ geq acid < geq base ⇒ basic soln.
geq acid = geq base ⇒ neutral soln.

**Find nature of resulting solution and also normality of resulting solution if 2 L of 1 M KOH is mixed with 1 L of 1M HCl.**

Ans

$geq\ left(OH^-\right) = |1\times1\times1 - 2\times1\times1|$

$= 1$

Soln → basic

$N_{OH^-} = M_{OH^-} = \frac{1}{3} = 0.33\,M$

WE in VaN with VoMeN & MeN

# Concentration of Mixtures If Nature is Same i.e. They do not React with Each Other

NaCl

5 geq acid

+

$Na_2SO_4$

3 geq acid

⟶

$Na^+$

8 g·eq·acid

# MIT

$g\,eq\ Total\ (\underline{H^+ \text{ or } OH^-}) = \Sigma\, geq$

$N_{\underline{H^+}} \text{ or } N_{\underline{OH^-}} = \dfrac{\Sigma\, geq}{\text{Total Volume}} = \underline{M_{H^+}} \text{ or } M_{\underline{OH^-}}$

QUESTION

**Find M of mixture is 2 L of 1 M HCl is mixed with 4 L of 2 N $H_2SO_4$.**

Ans $q_{eq}\ H^+ = 2 \times 1 \times 1 + 4 \times 2 = 10$

$N_{H^+} = M_{H^+} = \frac{10}{2+4} = \frac{10}{6} = \frac{5}{3} = 1.66\ M$

QUESTION

**Find molarity of mixturs when 1 L of 2 M NaOH and 2 L of 1 M $Sr(OH)_2$ are mixed together.**

Ans $M_{OH^-} = \frac{1 \times 2 \times 1 + 2 \times 1 \times 2}{1 + 2} = \frac{6}{3} = 2\,M$

QUESTION

(a) Find M of $Cl^-$ if 1 L of 2 M NaCl is mixed with 2 L of 1 M $CaCl_2$ ?

$$M_{Cl^-} = \frac{1\times2\times1 + 2\times1\times2}{1+2} = \frac{6}{3} = 2\,M$$

(b) $$M_{Na^+} = \frac{1\times2\times1 + 0}{1+2} = \frac{2}{3}\,M$$

(c) $$M_{Ca^{2+}} = \frac{0 + 2\times1\times2}{1+2} = \frac{4}{3}\,M$$

## QUESTION JEE ADVANCE 2011

**Dissolving 120 g of urea (mol. wt. 60) in 1000 g of water gave a solution of density 1.15 g/mL. The molarity of the solution is _____.**

1. 1.78 M
2. 2.00 M
3. 2.05 M
4. 2.22 M

$w_B = 120\,g$ $\quad n_B = \frac{120}{60} = 2$

$M_B = 60\,g$ $\quad w = 1000 + 120 = 1120$

$w_A = 1000\,g$

d of sol$^n$ $= 1.15\,g/ml$

$$\text{mass} = V(ml) \times d(g/ml)$$

$$1120 = V(ml) \times 1.15$$

$$V(ml) = \frac{1120}{1.15}\,ml$$

$$M = \frac{n_B}{V(L)} = \frac{2 \times 1.15 \times 1000}{1120}$$

## QUESTION JEE Advance 2016

**The mole fraction of a solute in a solution is 0.1. At 298 K, molarity of this solution is the same as its molality. Density of this solution at 298 K is 2.0 g cm$^{-3}$. The ratio of the molecular weights of the solute and solvent, $\left(\frac{MW_{solute}}{MW_{solvent}}\right)$, is** $\frac{M_B}{M_A}$

$\chi_B = 0.1$, $\chi_A = 0.9$ $\rightarrow \frac{n_B}{n_A} = \frac{1}{9}$

d of soln$^n$ = 2 g/ml

$\frac{W_B \times M_A}{M_B \times W_A} = \frac{1}{9}$

$M = m$

$\frac{n_B}{V(L)} = \frac{n_B}{W_A(Kg)}$

Solve Yourself.

$$M_{Cl^-} = \frac{0.1 \times 1 \times 1 + 0.1 \times 2 \times 1}{0.2}$$

$$M_{K^+} = \frac{0 + 0.1 \times 2 \times 1}{0.2}$$

$$M_{Na^+} = \frac{0.1 \times 1 \times 1 + 0}{0.2}$$

$\overset{0.1}{\underset{\equiv}{}}$ 100ml of 1M NaCl
+
$\underset{0.1}{}$ 100ml of 2M KCl ] ⇒ mix.

# Magarmach Practice Questions ( MPQ )

QUESTION

The density of NaOH solution is 1.2 g $cm^{-3}$. The molality of this solution is _____ m. (Round off to the nearest integer)

[Use : Atomic masses : Na = 23.0 u, O = 16.0 u, H = 1.0 u. Density of $H_2O$ = 1.0 $gem^{-3}$)

[ JEE MAINS 27 July. 2021 (Shift-I)]

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

QUESTION

A solution of sugar is obtained by mixing 200 g of its 25% solution and 500 g of its 40% solution (both by mass). The mass percentage of the resulting sugar solution is _____. (Nearest integer) [ JEE MAINS 11 Apr. 2023 (Shift-I)]

QUESTION

The density of 3 M solution of NaCl is 1.0 g $mL^{-1}$. Molality of the solution is _____ $\times 10^{-2}$ m. (Nearest integer).

Given : Molar mass of Na and Cl is 23 and 35.5 $gmol^{-1}$ respectively.

[ JEE MAINS 1 Feb. 2023 (Shift-I)]

QUESTION

If 80 g of copper sulphate $CuSO_4 \cdot 5H_2O$ is dissolved in deionised water to make 5 L solution, the concentration of the copper sulphate solution is ____x × $10^{-3}$ mol $L^{-1}$. The value of x is _____.

[Atomic masses: Cu: 63.54 u, S: 32 u, O:16 u, H: 1 u]

[ JEE MAINS 1 Sept. 2021 (Shift-II)]

QUESTION

An aqueous KCl solution of density 1.20 g $mL^{-1}$ has a molality of 3.30 mol $kg^{-1}$. The molarity of the solution in mol $L^{-1}$ is _____ . [Molar mass of KCl = 74.5]

[ JEE MAINS 26 Aug. 2021 (Shift-I)]

## Question (NCERT: PL-20 | NV, JEE Main April 08, 2025 (II))

20 mL of sodium iodide solution gave 4.74 g silver iodide when treated with excess of silver nitrate solution. The molarity of the sodium iodide solution is _____ M. (Nearest Integer value ) (Given : Na = 23, I = 127, Ag = 108, N = 14, O = 16 g $mol^{-1}$)

# THANK YOU