(Mole Concept)

SAFALTA CLASS™

An Initiative by अमर उजाला

DELHI POLICE
CONSTABLE

By

ONE OF THE MOST EXPERIENCED
FACULTY TEAM FROM DELHI

100+ Hrs | 60 Days

DELHI POLICE – CONSTABLE - 60 DAYS COURSE

NEW BATCH STARTS 17th AUGUST 2020

Session Time - SESSION -1: 3:30 PM TO 4:30 PM & SESSION- 2: 5: 00 - 6:00 PM

Course *Benefits*

SAFALTA CLASS™
An Initiative by अमर उजाला

- Live Interactive Classes on Zoom
- Accessible from Desktop or Mobile
- Access to recorded classes
- Weekly mock tests to evaluate progress
- PDF Study material to boost your preparation
- Special Q&A Sessions
- Daily Current Affairs
- Special Vocabulary Sessions
- Dedicated Telegram group
- Personalized Counselling Sessions

For more details follow the link or Scan the QR Code

https://bit.ly/33MNcpb

molecular mass

molar mass

MOLE CONCEPT

equivalant weight

Mole concept

Molarity

Molality

(1) N ⇒ Atomic weight = 14 unit (Atomic mass)

= 14 gm = M = 1 mole of N atom

= 6.022×10^{23} No. of atom of N.

N_2 ⇒ 2N = 28 unit

↓ =

Gas

28 unit ⟶ 1 molecule of N_2 Gas

⇓

molecular mass

* 28 gm $\Rightarrow$ 1 mole of N_2 molecule

$= 6.022 \times 10^{23}$ No. of N_2 molecules

$\Rightarrow$ 1 mole $= 6.022 \times 10^{23} = N_A$ = Avogadro No.

ex: H_2O :- $2H + O$

$\Rightarrow 2 \times 1$ unit $+ 16$ unit $\Rightarrow$ 18 unit

$\Rightarrow$ 1 molecule of H_2O

$\Rightarrow$ 18 gm = M = 1 mole of H_2O molecule

$= 6.022 \times 10^{23}$ H_2O molecule

* $H_2SO_4 \Rightarrow 2H + S + 4O$

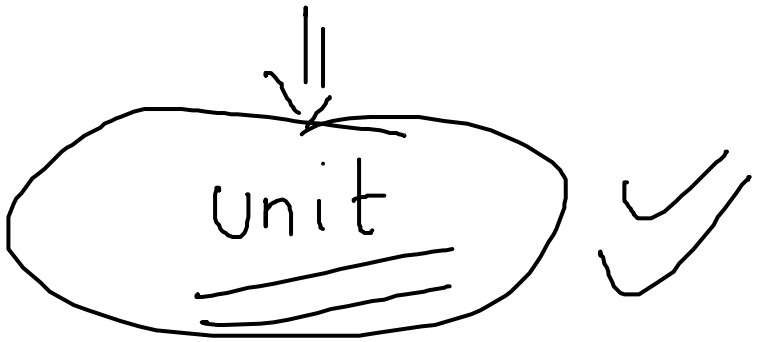
$\Rightarrow 2 + 32 + 64 \Rightarrow$ 98 unit

98 unit $\Rightarrow$ 1 molecule of H_2SO_4

98 gm $\Rightarrow$ 1 mole of molecule of H_2SO_4

$\Rightarrow 6.022 \times 10^{23}$

molecular mass



molar mass

* $CaCl_2 \Rightarrow Ca + Cl_2 \Rightarrow 40u + 2 \times 35.5$

$\Rightarrow$ 111 unit

$\Rightarrow$ 111 gm

Mole Concept

(1) $n = \frac{m}{M} = \frac{\text{Given mass}}{\text{Molar mass}}$

$\frac{m}{M} = \frac{N}{N_A}$

(2) $n = \frac{N}{N_A} = \frac{\text{No. of mol.}}{\text{Av. No.}}$

$\Rightarrow N = N_A \frac{m}{M}$

(1) 28 gm → N atom. No. of moles = ?

M = 14 gm

$\Rightarrow \frac{m}{M} = \frac{28}{14} = 2$ = no. of moles

(2) N = ?

$N = N_0 \frac{m}{M} = 6.022 \times 10^{23} \times \frac{28}{14} 2$

$= 12.044 \times 10^{23}$

(2) 176 gm of CO_2 ⇒ (i) No. of moles

(ii) No. of CO_2 molecules ?

⇒ CO_2 ⇒ C + 2O ⇒ 12 + 32 ⇒ 44 unit

44g = 1 mole CO_2 molecules $= 6.022 \times 10^{23}$

×4

176 = 4 mole $= 4 \times 6.022 \times 10^{23}$

$= 24.088 \times 10^{23}$

$\Rightarrow$ Equivalant Weight (तुल्यांकी भार)

$\Rightarrow$ $$\text{Eq. Weight} = \frac{\text{molecular weight}}{X}$$

$\Rightarrow$ X factor $\Rightarrow$
- (i) Acid (H^+)
- (ii) Base (OH^-)
- (iii) Salt (cations) (Total Positive charge)

* eg:- H_2SO_4 ⇒ Eq. weight = ?

⇒ $\text{Eq. W.} = \frac{\text{Mol. W.}}{X}$ ⇒ H_2SO_4

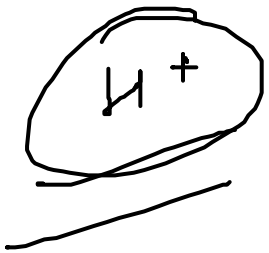
⇒ 98 unit ⇒ 98 gm

$= H^+ \quad SO_4^{2-}$

$= 2H^+$ ⇒ $\frac{98}{2} = 49$

eg:- $HCl \Rightarrow H + Cl \Rightarrow 1 + 35.5$

$\Rightarrow 36.5$ unit



M $\Rightarrow$ 36.5 gm

$\Rightarrow$ Eq. W. $\Rightarrow \frac{36.5}{1} = 36.5$ gm

✱ NDA ⇒ Oxalic Acid → Eq. W = ?

$(COOH)_2 \cdot 2H_2O \Rightarrow C_2H_2O_4 \cdot 2H_2O$

$\Rightarrow M = 2[12 + 1 + 32] + 2 \times 18$

$= 90 + 36 = 126$ gm

$Eq.\ W. = \frac{126}{2} = 63$ gm

* NaOH :- Eq. W. = ?

NaOH ⇒ 23 + 16 + 1 = 40 gm

$$\text{Eq. W.} = \frac{40\,\text{gm}}{1}$$

$$= 40\,\text{gm}$$

* $Ca(OH)_2$ $\Rightarrow 40 + 2 \times 17$

$\Rightarrow 74$

Eq. W. = ?

Moles mass = 74

$\Rightarrow \frac{74}{2}$ $\Rightarrow 37$

eg:- Salt ⇒ NaCl ⇒ Na^+ Cl^-

$= \frac{58.5}{1} = 58.5$

* $AlCl_3$ ⇒ Al^{3+} Cl^-

3 1

$27 + 3 \times 35.5$ → 106.5

⇒ $AlCl_3$

$Eq\,W \Rightarrow \frac{133.5}{3} = 44.5$

* $Al_2(SO_4)_3$ ⇒ mol. W. ⇒ M

Eq. weight = ?

$= \frac{M}{6}$

⇒ Al^{3+} SO_4^{2-}

2 3

⇒ $Al_2(SO_4)_3$

Q :- $H_2SO_4 + NaOH \longrightarrow NaHSO_4 + H_2O$

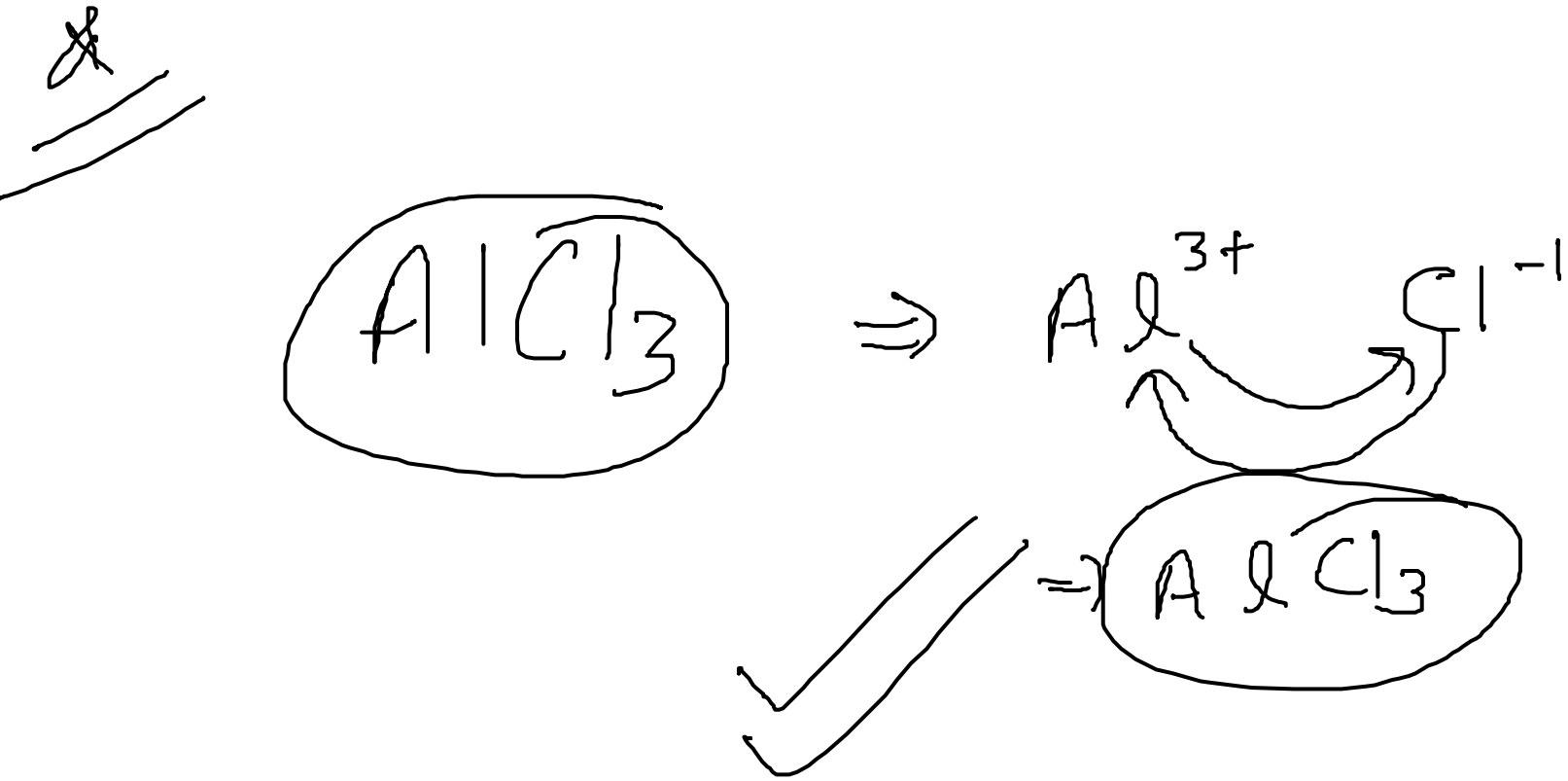
Eq. W = ?

1

$$\Rightarrow \text{mcWs} = \frac{98}{2} = 49(x)$$

$x \Rightarrow 1$

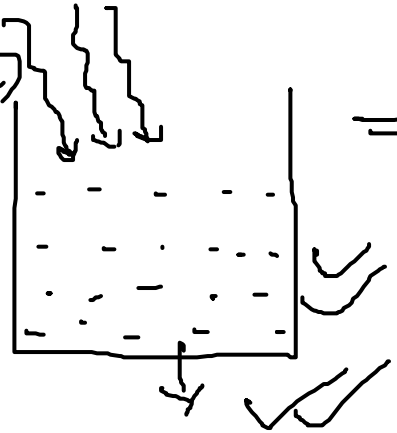
$$\Rightarrow \frac{98}{1} = 98$$


AlCl3
Al3+
Cl-1
AlCl3

* Molarity (मोलरता)

(Solute) (विलेय)

Sugar



⇒ Solution

Solvent (विलायक)

* Molarity :- No. of moles of Solute in 1 liter of Solution.

$$M\,(\text{molarity}) = \frac{\text{No. of moles of Solute}}{\text{Volume of Solution (in L)}}$$

$$M \rightarrow \frac{\text{mol}}{\text{L}}$$

eg:- 40g NaOH dissolve in 200 ml solution.

Molarity (M) = ?

$$M = \frac{n}{V} = \frac{1}{\frac{200}{1000}}$$

$$n = \frac{m}{M} = \frac{40}{40}$$

$$\boxed{n = 1}$$

$$\boxed{M = 5}\ \text{mol/L}$$

* 73 gm HCl ⟶ 250 ml water ? Molarity = ?

$\Rightarrow$ $n = \frac{730}{365} = 2$

$M = \frac{2 \times 1000}{250} = 8$ mol/L

Molality (मोलता)

* No. of moles of Solute present in 1 kg Solvent.

$$m = \frac{\text{No. of moles of Solute}}{\text{mass of Solvent (in kg)}}$$

$\Rightarrow$ mol/kg

eg: 40 gm NaOH Dissolve in 700 gm Solution.

molality = ?

$n = \frac{40}{40} = 1$

$= 700 - 40$

$= 660 \text{ gm}$

$\Rightarrow m = \frac{1 \times 1000}{660} = \frac{10}{7} = \frac{1 \times 1000}{669} = \frac{100}{66} = \frac{50}{33}$

eg: 196 gm H_2SO_4 → 300gm Solution

$$n = \frac{m}{M} = \frac{196}{98} = 2$$

Sol. = 300
- 196

104

$$m = \frac{2 \times 1000}{104}$$

$$= \frac{1000}{52} = \frac{250}{13}$$

Normality

* The no. of gram or mole eq. of solute present in 1 L of a solution.

$$N = \frac{n}{V(\text{in L})}$$

$N = \text{Molarity} \times \text{Basicity}$

$= \text{molarity} \times \text{Acidity}$

$HCl \rightarrow$ normality :- 2M

www.Youtube.com/safaltaclass

www.Facebook.com/safaltaclass

www.Instagram.com/safaltaclass

Google Play Store

SAFALTACLASS