CHEMISTRY

11 'C'

Basic Concepts of Chemistry

NEET

(3) $H_2C_2O_4 \cdot 2(H_2O)$

$= (2 \times 1) + (12 \times 2) + (16 \times 4) + 2[2 + 16]$

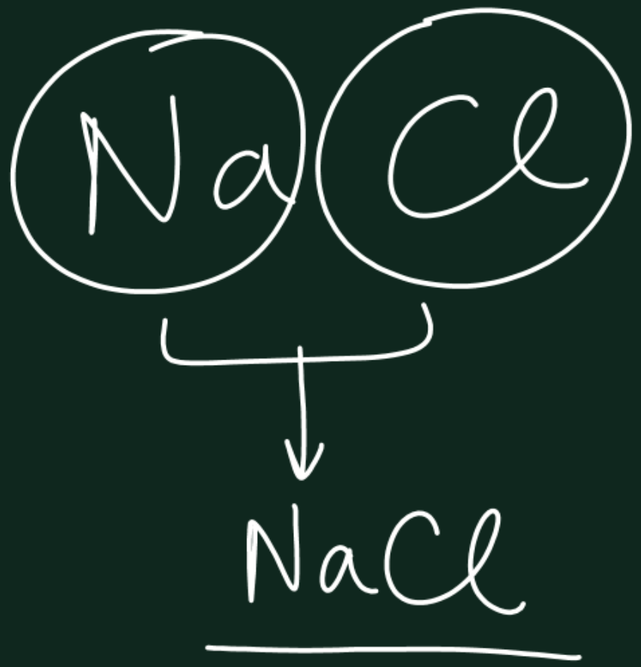
$= 2 + 24 + 64 + 2[18]$

$= 2 + 24 + 64 + 36$ ✓ $= 126u$ ✓

$H^{(1)}_{1}\ C^{(12)}_{6}\ O^{(16)}_{8}$

34

CO_2



H_2O

H : O

2 : 16

1 : 8

35 - Bonus

38 - A

C-12

$H_2O_{(1)}$ H_2O_2

O = 1 : 2

$H_1^1 \cdot H_1^2 H_1^3$

C^{12}, C^{13}, C^{14}

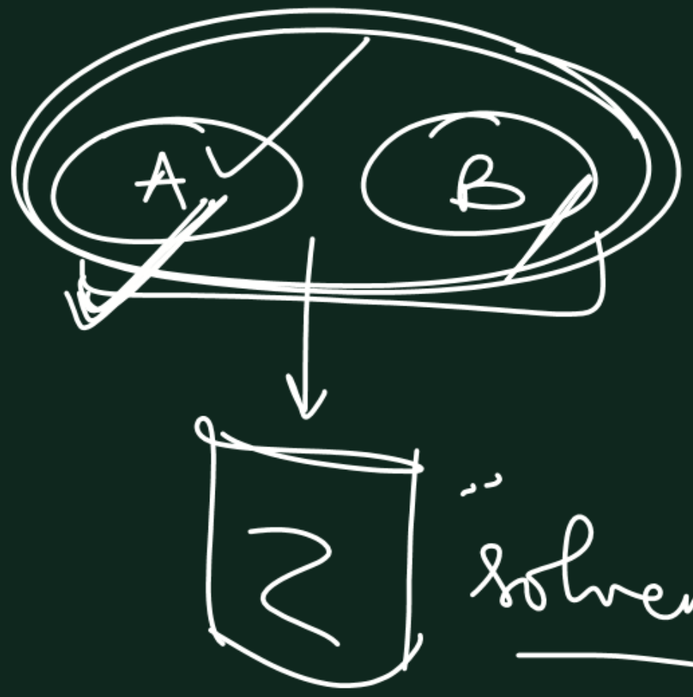
+1 ← $\frac{1.6 \times 10^{-19}}{1.6 \times 10^{-19}}$ Coulomb

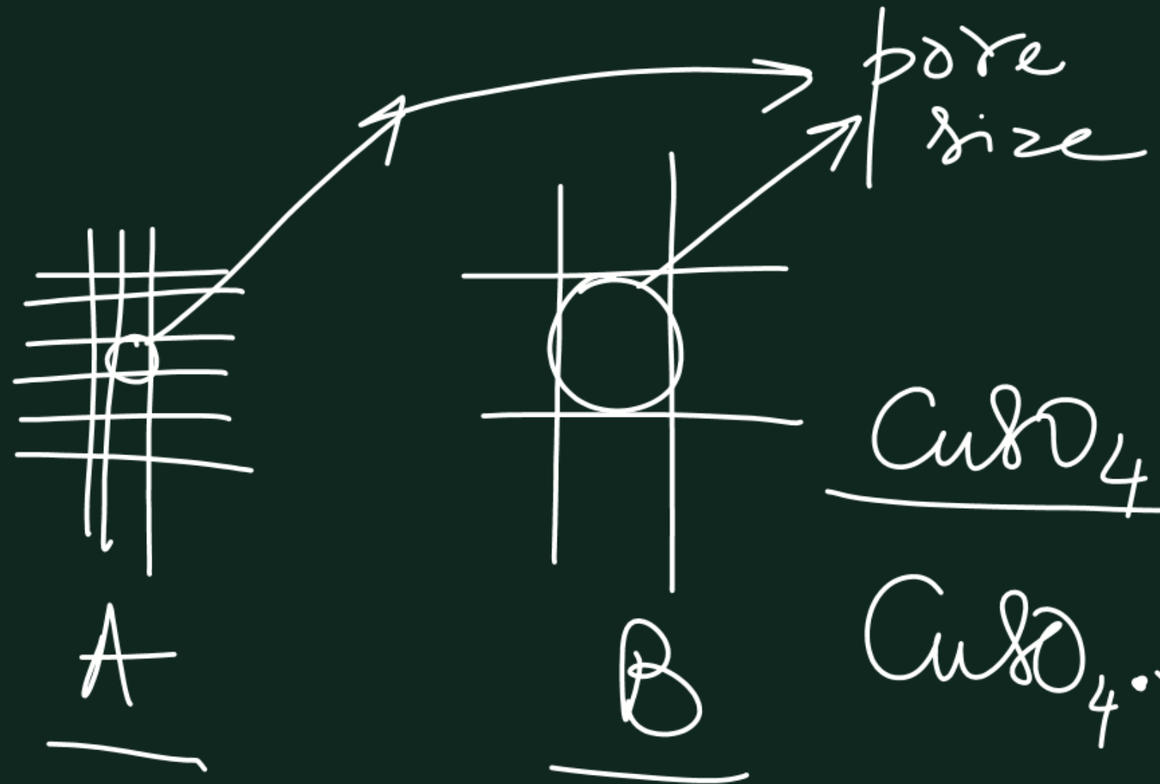
−1

16 → Mass

8

Mole concept ✓





$CuSO_4$

$CuSO_4 \cdot 5H_2O$

Mole Concept

$SO_2 = 32 + (16 \times 2)$

$= 64$

S_{16}^{32}, O_8^{16}

mass of 1 single SO_2 molecule = 64 u

mass of (6.022×10^{23}) SO_2 molecules = 64 g

mass of 1 mole SO_2 molecules

FINDING MOLES -

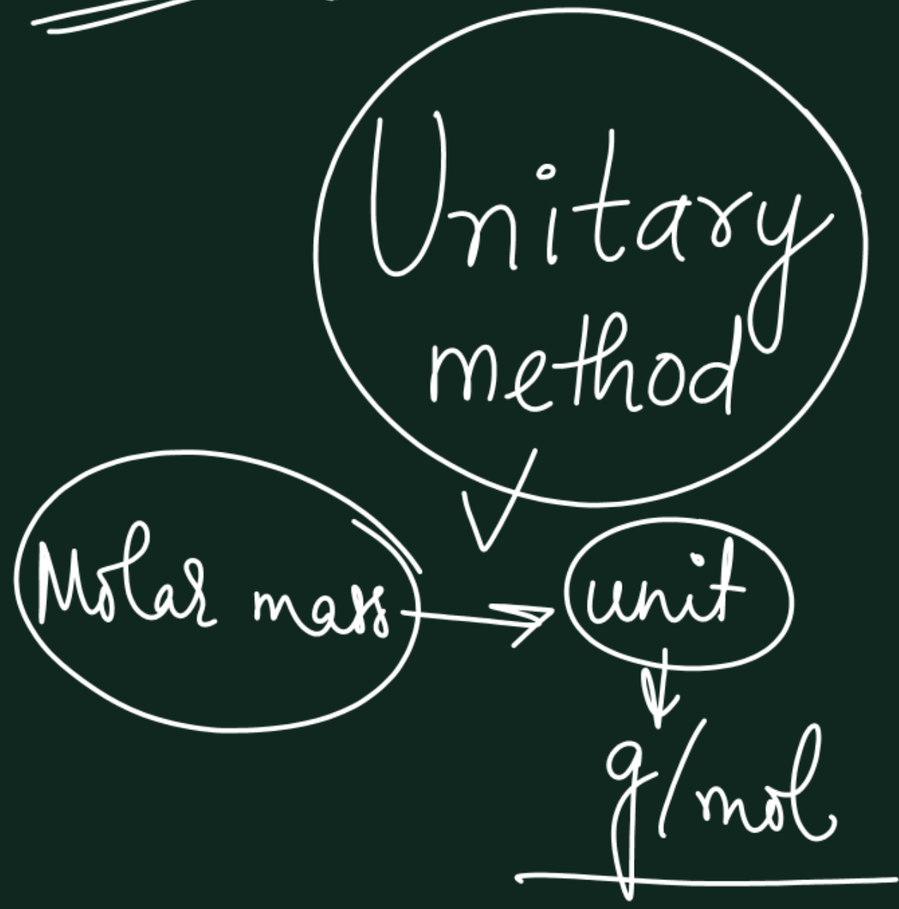
① 17 g NH_3 is how much moles?

$NH_3 = 14 + (1 \times 3)$

$= 17$ g/mol

$$\text{moles, } n = \left(\frac{\text{given mass}}{\text{Molar mass}}\right)$$

$$\downarrow n = \frac{17\text{ g}}{17\text{ g/mol}} = 1\text{ mol}$$



only WHOLE NUMBER

pens ≡ atoms, molecules, ions.

✓WHOLE
✓FRACTION
✗DECIMAL

dozen ≡ mole

dozen ≡ mole

Q. 36 pens → convert into dozen

$= \frac{36 \text{ pens}}{12 \text{ pens}} = 3 \text{ dozen}$

Q. 6 pens → convert into dozen

$= \frac{6 \text{ pens}}{12 \text{ pens}} = 0.5 \text{ dozen}$ ✓

Just like dozen, mole can also be in fraction, decimal, whole number.

& similarly just like pen, atoms, molecules can't be in fraction, decimal.

Q. Convert these into moles :-

1) 44g of CO_2 → $n = \frac{\text{given mass}}{\text{molar mass}} = \frac{44g}{44g/mol} = 1\ mol$

2) 34g of NH_3 → $n = \frac{34g}{17g/mol} = 2\ mol$

3) 90g of water → $n = \frac{90g}{18g/mol} = 5\ mol$

4) 1.7g of NH_3 → $n = \frac{1.7g}{17g/mol} = 0.1\ mol$

5) 0.18g of water (H_2O) → $n = \frac{0.18g}{18g/mol} = 0.01\ mol$

CO_2
$= 12 + (16 \times 2)$
$= 12 + 32$
$= 44g/mol$

mole → mol

H_2O
$= (2 \times 1) + 16$
$= 18g/mol$

$1\ mol = 6.022 \times 10^{23}$ units ✓

Q. How many water molecules are there in 0.18 g of water?

Soln → water → $H_2O = (2\times1)+16 = 18\ g/mol$

$\therefore$ moles, $n = \frac{0.18\ g}{18\ g/mol} = 0.01\ mol$

(0.18 g → given mass; 18 g/mol → molar mass)

Since, $1\ mol = 6.022\times10^{23}$

So, $0.01\ mol = 6.022\times10^{23}\times0.01 = 6.022\times10^{21}$ molecules of H_2O

10^{-2}

Homework

$mg = 10^{-3}\ g$

$kg = 10^{3}\ g$ $= 10^{3}\ g$

① Find moles —

a) 20 g of H_2O

b) 340 g of NH_3

c) 180 kg of H_2O

d) 200 g of $CaCO_3$

e) 18 mg of H_2O

② Find no. of molecules in —

a) 1.7 mg of NH_3

b) 180 g of water

c) 880 g of CO_2

d) 100 kg of $CaCO_3$.

Matter
1. occupies space ✓
2. have mass
3. felt by our sense organs

Heat , Temperature

Heat → matter ✗

Matter ✓

All three conditions must be satisfied simultaneously

NUMERICALS

Ex. 1. Calculate the mass of (i) an atom of silver (ii) a molecule of CO_2.

Solution (i) 1 mole of Ag atoms = 108 g = $6.022*10^{23}$ atoms

$6.022*10^{23}$ atoms of Ag have mass = 108 g

1 atom of Ag have mass = $108/6.022*10^{23} = 17.93*10^{-23}$ g

(ii) 1 mole of CO_2 = 44 g = $6.022*10^{23}$ molecules

$6.022*10^{23}$ molecules of CO_2 have mass = 44 g

1 molecule has mass = $44/6.022*10^{23} = 7.307*10^{-23}$ g

Numerical

Ex. 2. Calculate the number of moles in each of the following:-

(i) 392 g of H_2SO_4 (ii) 44.8litres of CO_2 at STP

(iii)$6.022*10^{23}$molecules of O_2 (iv) 9g of Al

solution:- (i) 1 mole of H_2SO_4 = 98 g

thus 98 g of H_2SO_4 = 1 mole of H_2SO_4

392 g of H_2SO_4 = 1/98*398 = 4 moles of H_2SO_4

(ii) 1 mole of CO_2 = 22.4 litres at STP

i.e.22.4 litres of CO_2 at STP = 1 mole

44.8 litres of CO_2 at STP = 1/22.4*44.8 = 2 moles of CO_2

(iii) 1mole of O2 molecules = $6.022*10^{23}$ molecules

6.022*1023 molecules = 1 mole of O2 molecules

(iv) 1 mole of Al = 27 g of Al

27 g of Aluminium = 1 mole of Al

9 g of Al = 1/27*9 = 0.33 mole of Al

EXERCISE

1 Calculate the number of molecules in 22 g of CO2 ?

2. Calculate the mass of CO_2 which contains the same number of molecules as contained in 40 g of O_2