Topic – Mole Concept

Mole = Collection of atoms or molecules.

1 mole = 6.02×10^{23} atoms or molecules (Avogadro Number)

formulas

$$\text{no. of mole} = \frac{\text{wt of substance in gm}}{\text{atomic wt}}$$

$$\text{no. of mole} = \frac{\text{Total no. of atoms}}{6.02 \times 10^{23}}$$

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Numericals

2019 ① find the number of moles in 11 gm CO_2.

Ans – Atomic wt of $CO_2 = 12 + 16 \times 2$
$= 44$

$$\text{no. of moles} = \frac{\text{wt in gm}}{\text{at wt}} = \frac{11}{44} = \frac{1}{4} = 0.25 \text{ Ans}$$

2017 ② find the number of moles of a substance having 12.04×10^{24} atoms.

Soln – $$\text{no. of moles} = \frac{\text{Total no. of atoms}}{6.02 \times 10^{23}} = \frac{12.04 \times 10^{24}}{6.02 \times 10^{23}} = 20 \text{ Ans}$$

2013 ③ find no. of atoms in 5 moles of CO_2.

Soln 1 mole $CO_2 = 6.02 \times 10^{23}$ atoms

So 5 mole $CO_2 = 5 \times 6.02 \times 10^{23}$
$= 30.1 \times 10^{23}$ Ans

④ find wt of 0.5 mole of CH_4.

Soln At wt of $CH_4 = 12 + 4 = 16$ So mole $0.5 = \frac{\text{wt}}{16}$

wt $= 16 \times 0.5 = 8$ gm Ans

2019
⑤ find the wt of H_2O having 1.204×10^{24} atoms.

Soln Atomic wt of H_2O $= 2\times1 + 16$
$= 18$

$$\frac{\text{wt of Substance}}{\text{At wt}} = \frac{1.204 \times 10^{24}}{6.02 \times 10^{23} \times 10}$$

$$\frac{wt}{18} = 2$$

$$\boxed{wt = 36\ gm}$$ Ans

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2017
⑥ find number of atoms in 3.2 gm CH_4.

Soln Atomic wt of CH_4 $= 12 + 4\times1$
$= 16$

$$\frac{wt}{At\ wt} = \frac{\text{Total no. of atoms}}{6.02 \times 10^{23}}$$

$$\frac{3.2}{16} = \frac{n}{6.02 \times 10^{23}}$$

$$n = 1.204 \times 10^{23}$$ Ans

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⑦ What is the mass of 0.2 mole of oxygen atom Ans - 3.2 gm

⑧ Calculate the mass of 0.5 mole of water molecules Ans - 9 gm

⑨ Calculate the no. of molecules of Sulphur (S_8) present in 16 gm of solid Sulphur. Ans - 3.76×10^{22}

⑩ Calculate the no. of aluminium ion present in 0.051 gm of Aluminium Oxide (Al_2O_3). Ans - 6.02×10^{20}

⑪ Calculate the no. of ions obtained from $CaCl_2$ when 222 gm of its dissolved in water Ans - 3.6132×10^{24} ions

(12) Calculate the number of moles in 2.58×10^{24} atoms of Oxygen.

Ans - 4.28

(13) Which has more no. of atoms 100 gm N_2 and 100 gm NH_3

Ans - NH_3

2017

(14) Compute the no of ions present in 5.85 gm Sodium Chloride (NaCl)

Solⁿ

no. of mole $= \frac{5.85}{58.5} = \frac{1}{10}$

$= 0.1$

At wt $= 23 + 35.5$

$= 58.5$

$NaCl \rightarrow Na^+ + Cl^-$

2 ions

Total moles of ions $= 2 \times 0.1 = 0.2$

no. of ions $= 0.2 \times 6.022 \times 10^{23}$

$= 1.2042 \times 10^{23}$ Ans

(15) find the wt of 2 mole of CO_2

Ans - 88 gm

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