

Topic - Mole Concept

Mole = Collection of atoms or molecules.

$$1 \text{ mole} = 6.02 \times 10^{23} \text{ atoms or molecules}$$

formulas

(Avogadro Number)

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

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

Numericals

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

Ans - Atomic wt of $\text{CO}_2 = 12 + 16 \times 2$
 $= 44$

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

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 $\text{CO}_2 = 6.02 \times 10^{23}$ atoms

So 5 mole $\text{CO}_2 = 5 \times 6.02 \times 10^{23}$
 $= 30.1 \times 10^{23} \text{ Ans}$

④ find wt of 0.5 mole of CH_4 .

Soln at wt of $\text{CH}_4 = 12 + 4 = 16$ So mole 0.5 = $\frac{\text{wt}}{16}$
 $\text{wt} = 16 \times 0.5 = 8 \text{ gm Ans}$



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

Soln Atomic wt of H_2O $= 2 \times 1 + 16$
 $= 18$

$$\frac{\text{wt of Substance}}{\text{At wt}} = \frac{1.204 \times 10^{24} \times 0.2}{6.02 \times 10^{23} \times 10}$$

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

$$\boxed{\text{wt} = 36 \text{ gm}} \quad \underline{\text{Ans}}$$

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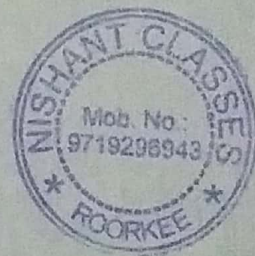
²⁰¹⁷
⑥ - find number of atoms in 3.2 gm CH_4 .

Soln Atomic wt of CH_4 $= 12 + 4 \times 1$
 $= 16$

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

$$\frac{3.2 \times 0.2}{16} = \frac{n}{6.02 \times 10^{23}}$$

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



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 it dissolved in water. Ans - 3.6132×10^{24} ions

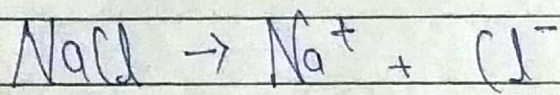
⑫ Calculate the number of moles in 2.58×10^{24} atoms of Oxygen.
Ans - 4.28

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 58.5 gm Sodium chloride ($NaCl$)

Soln

$$\begin{aligned} \text{No. of mole} &= \frac{58.5}{58.5} = \frac{1}{1} & \text{At wt} \\ &= 0.1 & = 23 + 35.5 \\ & & = 58.5 \end{aligned}$$



2 ions

$$\begin{aligned} \text{Total moles of ions} &= 2 \times 0.1 = 0.2 \\ \text{No. of ions} &= 0.2 \times 6.022 \times 10^{23} \\ &= \underline{1.2042 \times 10^{23}} \end{aligned}$$

Ans

⑮ find the wt of 2 mole of CO_2

Ans - 88 gm



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