

CHEMISTRY STUDY MATERIALS FOR CLASS 9

(NCERT based Revision of Mole Concept)

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MOLE CONCEPT

Question 1. How many molecules of water are there in 54 g of H₂O?

Solution 1. Molar Mass of H₂O = 2 + 16

$$= 18 \text{ g/moles}$$

So, number of moles of H₂O = Mass/Molar Mass

$$= 54/18$$

$$= 3 \text{ moles}$$

Now 1 moles = 6.022×10^{23} molecules

So 3 moles will have 18.066×10^{23} molecules

Question 2. Calculate the mass of 6.022×10^{23} molecules of NH₄Cl?

Solution 2. Molar mass (Molecular mass in gram) of NH₄Cl = 14+4+35.5

$$= 53.5 \text{ g}$$

No. of moles of NH₄Cl = 6.022×10^{23}

$$= 1 \text{ mole}$$

Mass of NH₄Cl = No. of moles × molar mass

$$= 1 \times 53.5 \text{ g}$$

$$= 53.5 \text{ g}$$

Question 3. Calculate the mass of 12.044×10^{23} Oxygen atoms.

Solution 3. No. of moles of Oxygen atoms = 12.044×10^{23}

$$= 12.044 \times 10^{23}$$

$$= 2 \text{ mole}$$

Mass of Oxygen atoms = No. of moles × atomic mass

$$= 2 \times 16 = 32 \text{ g}$$

Question 4. How many atoms of hydrogen are there in 34 g of NH_3 ? [Solution](#)

Solution 4. Molar mass (Molecular mass in gram) of $\text{NH}_3 = 14 + 3$

$$= 17 \text{ g}$$

No. of moles of $\text{NH}_3 = 34/17 = 4$ moles

Now Total Moles of Hydrogen Atoms = 12 moles

$$= 12 \times 6.022 \times 10^{23}$$

$$= 72.264 \times 10^{23} \text{ Hydrogen Atoms}$$

Question 5. Calculate the number of hydrogen atoms in 1 mole of H_2 .

Solution 5. 1 molecule of $\text{H}_2 = 2$ hydrogen atoms

So, 1 mole of $\text{H}_2 = 2$ mole hydrogen atoms

$$= 2 \times 6.022 \times 10^{23}$$

$$= 12.044 \times 10^{23} \text{ hydrogen atoms.}$$

Question 6. Calculate the number of Cu atoms in 0.3175 g of Cu. [Solution](#)

Solution 6. No. of moles of Cu = Mass of Cu / Atomic mass

$$= 0.3175 / 63.5$$

$$= 0.005 \text{ mole}$$

No. of Cu atoms = No. of moles \times Avogadro constant

$$= 0.005 \times 6.022 \times 10^{23}$$

$$= 30.11 \times 10^{20} \text{ Cu- atoms.}$$

Question 7. Find the number of moles and number of atoms of H and S in 10 mole of H_2S .

Solution 7. 1 mole of H_2S contains 2 mole of H, 1 mole of S

Therefore

10 mole of H_2S contains

$$20 \text{ mole of H} = 20 \times 6.022 \times 10^{23}$$

$$= 12.044 \times 10^{24} \text{ H- atoms}$$

$$10 \text{ mole of S} = 10 \times 6.022 \times 10^{23}$$

$$= 6.022 \times 10^{24} \text{ S- atoms}$$

Question 8. Calculate the number of atoms of each element in 245 g of KClO_3 .

Solution 8. Molecular mass of $\text{KClO}_3 = 39 + 35.5 + 3 \times 16 = 122.5 \text{ g}$

No. of mole of $\text{KClO}_3 = 245 \text{ g} / 122.5 \text{ g} = 2 \text{ mole}$

2 mole of KClO_3 contains

2 mole of K = $2 \times 6.022 \times 10^{23}$

$= 12.044 \times 10^{23}$ K atoms

2 mole of Cl = $2 \times 6.022 \times 10^{23}$

$= 12.044 \times 10^{23}$ Cl - atoms

6 mole of O = $6 \times 6.022 \times 10^{23}$

$= 1.806 \times 10^{24}$ O - atoms.

Question 9. Calculate how many methane molecules and how many carbon and hydrogen atoms are there in 25 g of Methane?

Solution 9. Molar mass of methane = 16

Number of moles = $25 / 16$

No of methane molecules = $25 / 16 \times 6.022 \times 10^{23}$

$= 9.411 \times 10^{23}$

No of carbon molecules = $1 \times 9.411 \times 10^{23}$

$= 9.411 \times 10^{23}$

No of hydrogen molecules = $4 \times 9.411 \times 10^{23}$

$= 3.74 \times 10^{24}$

Question 10. Calculate the total number of electron present in 3.2 g of CH_4 .

Solution 10. Molecular mass of $\text{CH}_4 = 12 + 4 \times 1$

$= 16 \text{ g}$

Moles of $\text{CH}_4 = 3.2 / 16$

$= 0.2$ moles

No. of electron in 1 molecule of $\text{CH}_4 = 6 + 4 = 10$ electrons

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

$= 12.044 \times 10^{23}$ electrons.

Question 11. State the number of atoms in 1 g atom of Aluminium?

Solution 11. 1 gm atom = atomic weight

So number of atoms will be Avogadro number = 6.022×10^{23}
