



STD 10-FIRST BELL 2.0-CHEMISTRY-SCIENCE DIARY-CLASS-14

Chapter 2

GAS LAW AND MOLE CONCEPT

One Mole Atom

- 1 mole of atom means 6.022×10^{23} Atoms.
- Eg: 12g C=1GAM Carbon= 6.022×10^{23} Carbon atoms=1 mole carbon atom
- 14g N=1GAM N= 6.022×10^{23} Nitrogen atom=1 mole Nitrogen atom.

Questions and Answers

1. Calculate the mole and Number of Oxygen atoms present in 64g of Oxygen?
(Atomic Mass of Oxygen=16)

Ans

$$\text{No. of Moles in 64g oxygen} = \frac{\text{Given mass in grams}}{\text{G AM}}$$

$$= \frac{64}{16} = 4\text{Mole}$$

$$\text{No of atoms} = 4 \times 6.022 \times 10^{23}$$

2. Write the number of atoms present in each of the following.
(Atomic Mass S=32, C=12& O=16)
 - I. 32g Sulphur
 - II. 32g Oxygen
 - III. 32g Carbon.

Ans.

- I. Number of Sulphur atoms = $\frac{32}{32} \times 6.022 \times 10^{23} = 6.022 \times 10^{23}$
 - II. Number of oxygen atoms = $\frac{32}{16} \times 6.022 \times 10^{23} = 2 \times 6.022 \times 10^{23}$
 - III. Number of carbon atoms = $\frac{32}{12} \times 6.022 \times 10^{23}$
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MOLECULAR MASS & GRAM MOLECULAR MASS.

- The amount of an element in grams equal to its atomic mass is called GRAM ATOMIC MASS (G AM).
- The amount of a substance in grams equal to its molecular mass is called GRAM MOLECULAR MASS (G MM).

CALCULATE MOLECULAR MASS.

(Atomic Mass: H=1, O=16, N=14)

| ELEMENT/COMPOUND | CHEMICAL FORMULA | MOLECULAR MASS |
|------------------|------------------|----------------|
| HYDROGEN | H ₂ | 1+1=2 |
| OXYGEN | O ₂ | 16+16=32 |
| NITROGEN | N ₂ | 14+14=28 |
| WATER | H ₂ O | 1+1+16=18 |
| AMMONIA | NH ₃ | 14+1+1+1= 17 |

Question and Answers

1. Calculate the molecular mass of glucose (C₆H₁₂O₆) & Sulphuric acid(H₂SO₄).
(Atomic mass C=12, H=1, O=16, S=32)

Ans:

Glucose (C₆H₁₂O₆) = 6×12+12×1+6×16=180

Molecular mass of H₂SO₄ =2×1+1×32+4×16=98

Relation between one GMM & Number of Molecules

Table Analysis

| ELEMENT/COMPOUND | MOLECULAR MASS | MASS IN GRAMS | GMM | NO OF MOLECULES |
|------------------|----------------|---------------|-------|--|
| H ₂ | 2 | 2g | 1G MM | 6.022×10²³ H₂ molecules |
| O ₂ | 32 | 32g | 1G MM | 6.022×10²³ O₂ molecules |
| N ₂ | 28 | 28g | 1G MM | 6.022×10²³ N₂ |

| | | | | molecules |
|------------------|----|-----|-------|---|
| H ₂ O | 18 | 18g | 1G MM | 6.022×10²³ H₂O molecules |
| NH ₃ | 17 | 17g | 1G MM | 6.022×10²³ NH₃ molecules |

- What is the molecular mass of Oxygen?
 - 32
- How many G MM present in 32g Oxygen?
 - 1 G MM
- How many molecules are present?
 - 6.022×10²³**

- ✓ ONE gram molecular mass of any substance contains AVAGADRO Number of molecules.
- ✓ No of molecules= No of G MM×6.022×10²³
- ✓ No of Gram Molecular Mass = $\frac{\text{Given mass in gram}}{\text{Gram Molecular mass (G MM)}}$

Question and Answers

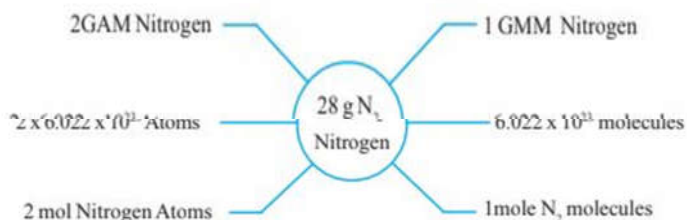
- How many G MM & number of molecules are present in 64g Oxygen?

- G MM= $\frac{\text{Given mass in gram}}{\text{Gram Molecular mass (G MM)}}$
 $\frac{64}{32} = 2 \text{ GMM}$

No of molecules = 2×6.022×10²³

One mole of molecules.

- 6.022×10²³ molecules are called one mole molecule.
- 1 G MM= 1 MOLE=6.022×10²³ MOLECULES.



HOME WORK

- Calculate the number of G MM & Number of molecules present in each sample?
 - 360 g glucose (Molecular mass =180).
 - 90 g water (molecular mass =18)
- The molecular mass of Ammonia is 17.
 - How much is the G MM of Ammonia.
 - Find out the number of moles of molecules present in 170 g of Ammonia.

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- c) Calculate the number of Ammonia molecules present in the above sample of Ammonia?
3. Calculate the Number of G MM and Number of Molecules in 44g CO₂ (Atomic mass C=12, O=16).

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