STD 10-FIRST BELL 2.0-SCIENCE DIARY-CLASS-13

Chapter-2

GAS LAWS AND MOLE CONCEPT

## How is the number of minute particles calculated?

- If the mass of a coin is 5g, then what will be the mass of thousand coins?
  5000g

- If the mass of coins (5g) in a bag is 50000g, then how many coins will be there?
  10000

- Is their any relationship between the mass and the number, if the particles are of the same mass?
  Yes

- ✓ **If the particles having the same size and mass, even though they are in crores, we can determine their accurate number on the basis of mass.**

Relative atomic mass

ELEMENT	RELATIVE ATOMIC MASS
H	1
He	4
N	14
Na	23
Cl	35.5
Ca	40

- The mass of an atom is compared to the mass of another atom and expressed as a number which shows how many times it is heavier than the other atom. The atomic mass of elements are expressed by considering $\frac{1}{12}$ mass of carbon -12 as one unit.

- When average atomic mass of elements are calculated taking into account the different isotopes of elements, the atomic mass of elements may have fractional values. However for practical purposes and calculations, most of these values are taken as whole number.

Number of atoms

C+ O_2 → CO_2
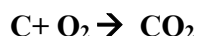
1. How many oxygen atoms combine with one Carbon atom?
- 2
2. How many Oxygen atom combine with 1000 Carbon atom?
- 2000 oxygen atoms

On the basis of the mass of Carbon and Oxygen, the numbers of atoms are scientifically found out.

ELEMENT	THE MASS TAKEN	NO OF ATOMS
C	12g	6.022×10^{23} Carbon atoms
O	16g	6.022×10^{23} Oxygen atoms

3. How many atoms are present in 12g Carbon?
- 6.022×10^{23}
4. A carbon atom combine with two oxygen atoms. If so, how many oxygen atoms are needed for combining with 6.022×10^{23} Carbon atoms?
- $2 \times 6.022 \times 10^{23}$ atoms

5. What will be the mass of these atoms?
- 32g

GRAM ATOMIC MASS (GAM)

- The mass of an element in grams to its atomic mass is called 1 GRAM ATOMIC MASS (1GAM) of the element. This may also shortened as 1 GRAM ATOM

- 12gram Carbon is known as 1 GRAM ATOMIC MASS of Carbon (1GAM).
- 16 gram of oxygen is called as 1GAM.

ELEMENT	ATOMIC MASS	MASS IN GRAMS	G A M	NO OF ATOMS
CARBON	12	12g	1GAM	6.022×10^{23}
OXYGEN	16	16g	1GAM	6.022×10^{23}
NITROGEN	14	14g	1GAM	6.022×10^{23}
CHLORINE	35.5	35.5g	1GAM	6.022×10^{23}

- 1GAM of any other element, the number of atoms will be equal.
- One gram atomic mass of any element contains 6.022×10^{23} atoms. This number is known as **AVAGADRO NUMBER (N_A).**
- **NO of Gram Atomic Mass $=\dfrac{\text{Given mass in gram}}{\text{G AM of the Element}}$**

1. How many G A M is present in 69g Sodium? How many atoms are present it?
   (Atomic mass Na=23)
   - **NO of Gram Atomic Mass $=\dfrac{\text{Given mass in gram}}{\text{G AM of the Element}}$**
     69g Sodium $=\dfrac{69}{23}=3$GAM
     NO of Atoms $=3\times6.022\times10^{23}$
2. How many G AM will be there in 46g of sodium? What about the number of atoms in it?
   (Atomic mass Na=23)
   - **NO of Gram Atomic Mass $=\dfrac{\text{Given mass in gram}}{\text{G AM of the Element}}$**
     46g Sodium $=\dfrac{46}{23}=2$GAM
     NO of Atoms $=2\times6.022\times10^{23}$

HOME WORK
- Calculate the number of atoms present in each of the samples?
  (Atomic mass N=14, O=16 & Na=23)
  1. 42g Nitrogen
  2. 80g Oxygen
  3. 92g Sodium

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