WORKSHEET 2

CHAPTER 3 – ATOMS AND MOLECULES

A. Tick (✓) the correct option.

1. Which of the following postulates of Dalton's atomic theory was found to be incorrect?
   a. All matter is made up of very tiny particles called atoms.
   b. Atoms are indivisible particles.
   c. Atoms combine in the ratio of small whole numbers to form compounds.
   d. The relative number and the kinds of atoms are constant in a given compound.
2. In a given reaction, 2.3 g of sodium carbonate reacted with 3 g of ethanoic acid to form 0.5 g of water and 4.8 g of sodium ethanoate. The given data is in accordance with which of the following laws?
   a. Law of conservation of mass
   b. Law of definite proportions
   c. Law of multiple proportions
   d. Law of conservation of energy
3. Ferrum is also known as
   a. Copper.
   b. Potassium.
   c. Iron.
   d. Sodium.
4. In sulphur dioxide, the ratio of sulphur and oxygen by mass is
   a. 4 : 1.
   b. 2 : 1.
   c. 1 : 2.
   d. 1 : 1.
5. The number of molecules present in 8 g of oxygen gas are
   a. 3.011×10^{23}
   b. 6.022×10^{23}
   c. 3.011×10^{22}
   d. 6.022×10^{22}

B. Fill in the blanks.

1. The law of _____ was given by Joseph L Proust.
2. _____ are the building blocks of all matter.
3. The number of moles present in 22 g of CO_2 is/are _____
4. The formula unit mass of $CaCl_2$ is _____
5. One _____ is equal to 96500 C.

C. State whether the following statements are true or false.

1. If in a reaction, the total mass of the reactants is 8.1 g, then the total mass of the products will also be 8.1 g.
2. Hydrogen and oxygen combine in the ratio 2 : 1 by mass to form water.
3. The symbol of aluminium is AL.
4. Empirical formula gives the simplest whole number ratio between the numbers of atoms of different elements present in one molecule of the compound.
5. Molar mass is the mass of one mole of a substance.

Name: ..... Teacher's signature: .....

Class: IX Date: .....

D. Match the following.

1.	Mass of 0.25 moles of P_4	1.204×10^{24}
2.	Number of atoms in 11.5 g of sodium	6.022×10^{23}
3.	Number of molecules in 56 g of N_2	12 g
4.	Gram-atomic mass of carbon	3.011×10^{23}
5.	Avogadro's number	31 g

E. Answer the following questions.

Very Short Answer Questions

1. Define the law of multiple proportions.
2. What is atomic mass unit?

Short Answer Questions

1. If the molar mass of oxygen molecule is 32 g, calculate the mass of one molecule of oxygen.
2. What mass of sulphur dioxide contains the same number of molecules as there are atoms in 2.7 g of aluminium?

Long Answer Questions

1. Define symbol. What is the significance of the symbol of an element?
2. The chemical formula of glucose is $C_6H_{12}O_6$. What is the percentage composition of this compound?

ANSWERS

WORKSHEET 1

A. Tick (✓) the correct option.

1. b 2. a 3. c 4. a 5. a

B. Fill in the blanks.

1. constant proportions 2. Atoms 3. 0.5 4. 111 u 5. Faraday

C. State whether the following statements are true or false.

1. T 2. F 3. F 4. T 5. T

D. Match the following.

1.	Mass of 0.25 moles of P_4	31 g
2.	Number of atoms in 11.5 g of sodium	3.011×10^{23}
3.	Number of molecules in 56 g of N_2	1.204×10^{24}
4.	Gram-atomic mass of carbon	12 g
5.	Avogadro's number	6.022×10^{23}

E. Answer the following questions.

Very Short Answer Questions

1. According to the law of multiple proportions, when two elements combine to form two or more compounds, the different masses of one element which combine with a fixed mass of the other, bear a simple ratio to one another.

2. The mass equal to $\frac{1}{12}$th of the mass of a ^{12}C atom is called one atomic mass unit.

Short Answer Questions

1. We are given that the molar mass of oxygen molecule is 32 g. This means that the mass of 6.022×10^{23} molecules of oxygen in 32 g. So,

$$\text{Mass of } 6.022 \times 10^{23} \text{ molecules of oxygen} = 32 \text{ g}$$

$$\text{Mass of one molecule of oxygen} = \frac{32}{6.022 \times 10^{23}} \text{ g} = 5.314 \times 10^{-23} \text{ g}$$

So, the mass of one molecule of O_2 is 5.314×10^{-23} g.

2. We will first calculate the number of atoms present in 2.7 g of aluminium. The molar mass of aluminium is 27 g. This means that, there are 6.022×10^{23} atoms present in 27 g of aluminium. Thus,

$$\text{Number of atoms present in 27 g of aluminium} = 6.022 \times 10^{23}$$

$$\text{Number of atoms present in 1 g of aluminium} = \frac{6.022 \times 10^{23}}{27}$$

$$\text{Number of atoms present in 2.7 g of aluminium} = \frac{6.022 \times 10^{23} \times 2.7}{27} = 6.022 \times 10^{22}$$

Thus, we have to find that mass of sulphur dioxide which contains 6.022×10^{22} molecules. We know that the molar mass of sulphur dioxide is 64 g. Thus, the mass of 6.022×10^{23} molecules of sulphur dioxide is 64 g. So,

Mass of 6.022×10^{23} molecules of sulphur dioxide = 64 g

$$\text{Mass of 1 molecule of sulphur dioxide} = \frac{64}{6.022 \times 10^{23}}\ \text{g}$$

$$\text{Mass of } 6.022 \times 10^{22} \text{ molecules of sulphur dioxide} = \frac{64 \times 6.022 \times 10^{22}}{6.022 \times 10^{23}}\ \text{g} = 6.4\ \text{g}$$

Long Answer Questions

1. The symbol of an element is an abbreviation (short name) for the full name of the element, or a shorthand notation for its name. The significance of symbol is as follows:

   a. Symbol represents the name of the element.

   b. It represents one atom of the element.

   c. It represents a definite mass of the element (equal to atomic mass expressed in gram).

   d. It represents mass of the element which contains one Avogadro's number of atoms of that element.

2. We are given that the chemical formula of glucose is $C_6H_{12}O_6$. So, the molecular mass of glucose will be

$$= 6 \times \text{Atomic mass of carbon} + 12 \times \text{Atomic mass of hydrogen} + 6 \times \text{Atomic mass of oxygen}$$

$$= 6 \times 12\ \text{u} + 12 \times 1\ \text{u} + 6 \times 16\ \text{u}$$

$$= 72\ \text{u} + 12\ \text{u} + 96\ \text{u}$$

$$= 180\ \text{u}$$

$$\text{Mass percentage of carbon in glucose} = \frac{72}{180} \times 100 = 40\%$$

$$\text{Mass percentage of hydrogen in glucose} = \frac{12}{180} \times 100 = 6.67\%$$

$$\text{Mass percentage of oxygen in glucose} = \frac{96}{180} \times 100 = 53.33\%$$

Hence, glucose contains 40% carbon, 6.67% hydrogen and 53.33% oxygen.