NCERT TEXTUAL EXERCISE (SOLVED)

1. A 0.24 g sample of compound of oxygen and boron was found by analysis to contain 0.096 g of boron and 0.144 g of oxygen. Calculate the percentage composition of the compound by weight.

Ans. Total mass of compound = 0.24 g

Boron (B) = $\frac{0.096 \times 100}{0.24} = 40\%$

Oxygen (O) = $\frac{0.144 \times 100}{0.24} = 60\%$

2. When 3 g of carbon is burnt in 8 g oxygen, 11 g of carbon dioxide is produced. What mass of carbon dioxide will be formed when 3 g of carbon is burnt in 50 g of oxygen ? Which law of chemical combination will govern your answer ?

Ans. For 3 g of carbon, 8 gm of oxygen is required to form 11 g of carbondioxide. When 3 g of carbon is burnt in 50 g of oxygen, only 8 gof oxygen is used up for burning and rest of the oxygen gas remains as it is.

Law of constant composition or law of definite proportions.

3. What are polyatomic ions? Give examples.

Ans. Cluster of atoms carrying either +ve or –ve charges is called polyatomic ion, e.g. PO_4^{3-}, SO_4^{2-}, NH_4^{+1}

4. Write the chemical formulae of the following:

(a) Magnesium chloride (b) Calcium oxide

(c) Copper nitrate (d) Aluminium chloride

(e) Calcium carbonate

Ans. (a) $MgCl_2$ (b) CaO

(c) $Cu(NO_3)_2$ (d) $AlCl_3$

(e) $CaCO_3$

5. Give the names of the elements present in the following compounds:

Ans. (a) CaO – calcium and oxygen

(b) HBr – hydrogen and bromine

(c) $NaHCO_3$ – sodium, hydrogen, carbon and oxygen

(d) K_2SO_4 – potassium, sulphur, oxygen

6. Calculate the molar mass of the following substances:

(a) Ethyne, C_2H_2

(b) Sulphur molecule, S_8

(c) Phosphorus molecule, P_4 (atomic mass of phosphorus = 31)

(d) Hydrochloric acid, HCl

(e) Nitric acid, HNO_3

Ans. (a) $C_2H_2 = 12 \times 2 + 1 \times 2$

$= 24 + 2 = 26$ g

(b) $S_8 = 16 \times 8$

$= 128$ g

(c) $P_4 = 31 \times 4$

$= 124$ g

(d) $HCl = 1 + 35.5$

$= 36.5$ g

(e) $HNO_3 = 1 + 14 + 16 \times 3$

$= 15 + 48$

$= 63$ g

7. What is the mass of –

(a) 1 mole of nitrogen atoms?

(b) 4 moles of aluminium atoms (atomic mass of aluminium = 27)?

(c) 10 moles of sodium sulphite (Na_2SO_3)?

Ans. (a) 1 mole of nitrogen atoms weighs 14 g.

(b) 4 mole of aluminium atoms: $27 \times 4 = 108$ g.

(c) 10 moles of sodium sulphite Na_2SO_3:

$= 23 \times 2 + 16 \times 3 + 32$

$= 46 + 48 + 32$

$= 126$ g

8. Convert into mole.

(a) 12 g of oxygen gas (b) 20 g of water

(c) 22 g of carbon dioxide

Ans. (a) 32 g of oxygen gas = 1 mole

$\therefore$ 12 g of oxygen gas = $\frac{12}{32}$ = 0.375 moles

(b) 18 g of water = 1 mole of water

$\therefore$ 20 g of water = $\frac{20}{18}$ = 1.11 moles

(c) 44 g of carbon dioxide = 1 mole of CO_2

$\therefore$ 22 g of $CO_2 = \frac{22}{44} = 0.5$ moles

9. What is the mass of :

(a) 0.2 mole of oxygen atoms?

(b) 0.5 mole of water molecules?

Ans. (a) 1 mole of oxygen atoms = 16 g

$\therefore$ 0.2 mole of oxygen atoms = $16 \times 0.2 = 3.2$ g

(b) 1 mole of water molecules = 18 g

$\therefore$ 0.5 mole of water molecules = $18 \times 0.5 = 9$ g

10. Calculate the number of molecules of sulphur (S_8) present in 16 g of solid sulphur.

Ans. Molar mass of $S_8 = 32 \times 8 = 256$ g

1 mole of S_8 sulphur molecules = 256 g

$\therefore$ 16 g of sulphur = $\frac{16}{256} = \frac{1}{16}$ moles $= 0.125$ moles

1 mole of S_8 molecules = 6.023×10^{23} number of molecules

$\therefore \frac{1}{16}$ mole of $S_8 = 6.023 \times 10^{23}$ number of molecules $\times \frac{1}{16}$.

11. Calculate the number of aluminium ions present in 0.051 g of aluminium oxide.

(**Hint:** The mass of an ion is the same as that of an atom of the same element. Atomic mass of Al = 27 u)

Ans. 1 mole of Al_2O_3 contains 2 moles of aluminium

102 g of Al_2O_3 contains 2 moles of aluminium

102 g of Al_2O_3 contains $2 \times 6.023 \times 10^{23}$ aluminium ions

$\therefore$ 0.051 g of Al_2O_3 will contain

$$= \frac{2 \times 6.023 \times 10^{23} \times 0.051}{102}$$

$$= \frac{2 \times 6.023 \times 10^{23} \times 51}{102 \times 10^3}$$

$= 6.023 \times 10^{21}$ aluminium ions

$\therefore$ 0.051 g of aluminium oxide contains 6.023×10^{21} aluminium ions