CHAPTER 3

ATOMS AND MOLECULES

CLASS 9TH

NCERT EXERCISE AND SOLUTIONS - SCIENCE

Q. 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.

ANSWER:-

Given,
Mass of boron = 0.096 g
Mass of oxygen = 0.144 g
Mass of sample = 0.24 g
The percentage of boron by weight in the compound = 0.096/ 0.24 x 100% = 40 %
And percentage of oxygen by weight in the compound 0.144/0.24 x 100% = 60 %

Q. 2. When 3.0 g of carbon is burnt in 8.00 g oxygen, 11.00 g of carbon dioxide is produced. What mass of carbon dioxide will be formed when 3.00 g of carbon is burnt in 50.00 g of oxygen? Which law of chemical combination will govern your answer?

ANSWER:-

Carbon + Oxygen → Carbon dioxide
When 3 g of carbon reacts with 8 g of oxygen, 11 g of carbon dioxide is produced.
If 3 g of carbon is burned in 50 g of oxygen, only 3 g of carbon will react with 8 g of oxygen to form 11 g of carbon dioxide.
The remaining 42 g of oxygen (50 g - 8 g) will not react.
This observation follows the law of constant proportions.

Q. 3. What are polyatomic ions? Give examples.

ANSWER:-

A polyatomic ion is a charged group of atoms, which can carry either a positive or negative charge. Examples include Ammonium ion (NH_4^+), Hydroxide ion (OH^-), Carbonate ion (CO_3^{2-}), Sulphate ion (SO_4^{2-})

Q. 4. Write the chemical formulae of the following.

(a) Magnesium chloride
(b) Calcium oxide
(c) Copper nitrate
(d) Aluminium chloride
(e) Calcium carbonate.

ANSWER:-

(a) $MgCl_2$
(b) CaO
(c) $Cu(NO_3)_2$
(d) $AlCl_3$
(e) $CaCO_3$

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

(a) Quick lime
(b) Hydrogen bromide
(c) Baking powder
(d) Potassium sulphate

ANSWER:-

Compound	Chemical Formula	Elements Present
Quick lime	CaO	Calcium, Oxygen
Hydrogen bromide	HBr	Hydrogen, Bromine
Baking powder	$NaHCO_3$	Sodium, Hydrogen, Carbon, Oxygen
Potassium sulphate	K_2SO_4	Potassium, Sulphur, Oxygen

Q. 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

ANSWER:-

Molar mass of C_2H_2 = 2 x12 + 2 x 1 = 28g /mol
Molar mass of S_8 = 8 x 32 = 256 g/mol
Molar mass of P_4 = 4 x 31 = 124g / mol
Molar mass of HCl = 1+ 35.5 = 36.5g / mol
Molar mass of HNO_3 1 + 14 + 3 x 16 = 63g / mol