CHEMISTRY STUDY MATERIALS FOR CLASS 9
(NCERT based Revision Notes of Chapter - 3)

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ATOMS AND MOLECULES

Exercise questions

Q1. 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:

Mass of boron = 0.096 g

(Given) Mass of oxygen = 0.144 g

Mass of sample = 0.24 g (Given)

Thus, percentage of boron by weight in the compound = $\frac{0.096}{0.24} \times 100 = 40\%$

And, percentage of oxygen by weight in the compound = $\frac{0.144}{0.24} \times 100 = 60\%$

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

3 g of carbon reacts with 8 g of oxygen to produce 11 g of carbon dioxide.

If 3 g of carbon is burnt in 50 g of oxygen, then 3 g of carbon will react with 8 g of oxygen. The remaining 42 g of oxygen will be left un-reactive.

In this case also, only 11 g of carbon dioxide will be formed.

The above answer is governed by the law of constant proportions.

Q 3. What are polyatomic ions? Give examples.

Answer: A polyatomic ion is a group of atoms carrying a charge (positive or negative). For example, 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) Magnesium chloride → $MgCl_2$

(b) Calcium oxide → CaO

(c) Copper nitrate → $Cu(NO_3)_2$

(d) Aluminium chloride → $AlCl_3$

(e) Calcium carbonate → $CaCO_3$

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.

(e) Answer:

(a) Quick lime Chemical formula : CaO, Elements present: Calcium, Oxygen

(b) Hydrogen bromide, formula : HBr Elements present: Hydrogen, Bromine

(c) Baking powder, Chemical formula : NaHCO3

Elements present: Sodium, Hydrogen, Carbon, Oxygen

(d) Potassium sulphate. Chemical formula : K_2SO_4

Elements present: 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:

(a) Molar mass of ethyne, $C_2H_2 = 2 \times 12 + 2 \times 1 = 26$ g

(b) Molar mass of sulphur molecule, $S_8 = 8 \times 32 = 256$ g

(c) Molar mass of phosphorus molecule, $P_4 = 4 \times 31 = 124$ g

(d) Molar mass of hydrochloric acid, $HCl = 1 + 35.5 = 36.5$ g

(e) Molar mass of nitric acid, $HNO_3 = 1 + 14 + 3 \times 16 = 63$ g

Q 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)?

Answer:

(a) The mass of 1 mole of nitrogen atoms is 14 g.

(b)The mass of 4 moles of aluminium atoms is (4×27) g = 108 g

(c)The mass of 10 moles of sodium sulphite (Na_2SO_3) is

$$10 \times [2 \times 23 + 32 + 3 \times 16] \text{ g} = 10 \times 126 \text{ g} = 1260 \text{ g}$$

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