



QUESTIONS FROM NCERT TEXTBOOK

Question 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: Boron and oxygen compound \rightarrow Boron + Oxygen

0.24 g \rightarrow 0.096 g + 0.144 g

Percentage composition of the compound

For boron:

0.24 g \rightarrow 0.096 g

100 g \rightarrow ?

$$\frac{100 \times 0.096}{0.24} = 40\%$$

For oxygen:

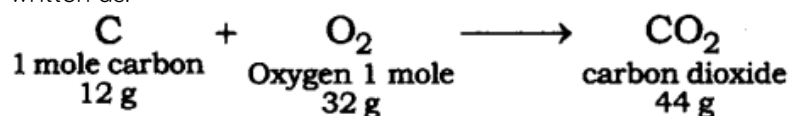
0.24 g \rightarrow 0.144 g of oxygen

100 g \rightarrow ?

$$\frac{100 \times 0.144}{0.24} = 60\%$$

Question 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: The reaction of burning of carbon in oxygen may be written as:



It shows that 12 g of carbon burns in 32 g oxygen to form 44 g of carbon dioxide. Therefore 3 g of carbon reacts with 8 g of oxygen to form 11 g of carbon dioxide. It is given that 3.0 g of carbon is burnt with 8 g of oxygen to produce 11.0 g of CO_2 . Consequently 11.0 g of carbon dioxide will be formed when 3.0 g of C is burnt in 50 g of oxygen consuming 8 g of oxygen, leaving behind $50 - 8 = 42$ g of O_2 . The answer governs the law of constant proportion.

Question 3. What are poly atomic ions? Give examples.

Answer: The ions which contain more than one atoms (same kind or may be of different kind) and behave as a single unit are called polyatomic ions e.g., OH^- , SO_4^{2-} , CO_3^{2-} .

Question 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

Symbol → Mg Cl

Change → +2 -1

Formula → MgCl_2

(b) Calcium oxide

Symbol → Ca O

Charge → +2 -2

Formula → CaO

(c) Copper nitrate

Symbol → Cu NO

Change → +2 -1

Formula → $\text{Cu}(\text{NO}_3)_2$

(d) Aluminium chloride

Symbol → Al Cl

Change → +3 -1

Formula → AlCl_3

(d) Calcium carbonate

Symbol → Ca CO_3

Change → +2 -2

Formula → CaCO_3

Question 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: (a) Quick lime → Calcium oxide

Elements → Calcium and oxygen

(b) Hydrogen bromide

Elements → Hydrogen and bromine

(c) Baking powder → Sodium hydrogen carbonate

Elements → Sodium, hydrogen, carbon and oxygen

(d) Potassium sulphate

Elements → Potassium, sulphur and oxygen

Question 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: The molar mass of the following: [Unit is 'g']

(a) Ethyne, $\text{C}_2\text{H}_2 = 2 \times 12 + 2 \times 1 = 24 + 2 = 26 \text{ g}$

(b) Sulphur molecule, $\text{S}_8 = 8 \times 32 = 256 \text{ g}$

(c) Phosphorus molecule, $\text{P}_4 = 4 \times 31 = 124 \text{ g}$

(d) Hydrochloric acid, $\text{HCl} = 1 \times 1 + 1 \times 35.5 = 1 + 35.5 = 36.5 \text{ g}$

(e) Nitric acid, $\text{HNO}_3 = 1 \times 1 + 1 \times 14 + 3 \times 16 = 1 + 14 + 48 = 63 \text{ g}$

Question 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) Mass of 1 mole of nitrogen atoms = 14 g

(b) 4 moles of aluminium atoms

Mass of 1 mole of aluminium atoms = 27 g

∴ Mass of 4 moles of aluminium atoms = $27 \times 4 = 108 \text{ g}$

(c) 10 moles of sodium sulphite (Na_2SO_3)

Mass of 1 mole of $\text{Na}_2\text{SO}_3 = 2 \times 23 + 32 + 3 \times 16 = 46 + 32 + 48 = 126 \text{ g}$

\therefore Mass of 10 moles of $\text{Na}_2\text{SO}_3 = 126 \times 10 = 1260 \text{ g}$

Question 8. Convert into mole.

(a) 12 g of oxygen gas

(b) 20 g of water

(c) 22 g of Carbon dioxide.

Answer:

(a) Given mass of oxygen gas = 12 g

Molar mass of oxygen gas (O_2) = 32 g

Mole of oxygen gas $12/32 = 0.375$ mole

(b) Given mass of water = 20 g

Molar mass of water (H_2O) = $(2 \times 1) + 16 = 18 \text{ g}$

Mole of water = $20/18 = 1.12$ mole

(c) Given mass of Carbon dioxide = 22 g

Molar mass of carbon dioxide (CO_2) = $(1 \times 12) + (2 \times 16)$

$= 12 + 32 = 44 \text{ g}$

\therefore Mole of carbon dioxide = $22/44 = 0.5$ mole

Question 9. What is the mass of:

(a) 0.2 mole of oxygen atoms?

(b) 0.5 mole of water molecules?

Answer:

(a) Mole of Oxygen atoms = 0.2 mole

Molar mass of oxygen atoms = 16 g

Mass of oxygen atoms = $16 \times 0.2 = 3.2 \text{ g}$

(b) Mole of water molecule = 0.5 mole

Molar mass of water molecules = $2 \times 1 + 16 = 18 \text{ g}$.

Mass of $\text{H}_2\text{O} = 18 \times 0.5 = 9 \text{ g}$

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

Answer: Molar mass of S_8 sulphur = $256 \text{ g} = 6.022 \times 10^{23}$ molecule

Given mass of sulphur = 16 g

$$\begin{aligned}\text{Molecules of sulphur} &= \frac{16 \times 6.022 \times 10^{23}}{256} = \frac{96.35 \times 10^{23}}{256} \\ &= 0.376 \times 10^{23} \\ &= 3.76 \times 10^{22} \text{ molecules}\end{aligned}$$

Question 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)

Answer: Molar mass of aluminium oxide Al_2O_3

$= (2 \times 27) + (3 \times 16)$

$= 54 + 48 = 102 \text{ g}$.

\therefore 102 g of Al_2O_3 contains $= 2 \times 6.022 \times 10^{23}$ aluminium ions

$$\begin{aligned}\therefore 0.051 \text{ g of } \text{Al}_2\text{O}_3 \text{ contains} &= \frac{2 \times 6.022 \times 10^{23}}{102} \times 0.051 \\ &= \frac{12.044 \times 10^{23} \times 0.051}{102} = \frac{0.614 \times 10^{23}}{102} \\ &= 0.006022 \times 10^{23} \\ &= 6.022 \times 10^{20} \text{ Al}^{3+} \text{ ions}\end{aligned}$$

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