SECTION "B" SHORT-ANWER QUESTIONS (Marks: 40)

Note: Answer any TEN questions from this section. Each question carries 4 marks.

Q.2 What is Chemistry? Write names of any six branches of Chemistry.

Q.3 State the Law of Multiple Proportion and explain it with the help of two examples.

Q.4 What is a chemical reaction? Describe 'decomposition reaction' and 'combustion reaction' with an example of each type of reaction.

Q.5 What are "double salts"? Write names of any three such salts with their chemical formula.

Q.6 Write down four salient features of Mendleev's periodic table.

Q.7 How many atoms or molecules are there in?

(i) 8g of sulphur (S) (ii) 8.8g of Carbondioxide (CO_2)

[Atomic masses : S = 32, C = 12, O = 16]

(i) 8g of sulphur (S)

Data

Mass of Sulphur = 8g

Atomic Mass of Sulphur = 32g

Avagadro's Number = $N_A = 6.02 \times 10^{23}$

Number of Atoms = ?

Solution

$$No.\ of\ Atoms = \frac{N_A \times Mass\ of\ Substance}{Atomic\ Mass}$$

$$= \frac{6.02 \times 10^{23} \times 8}{32}$$

$$= \frac{6.02 \times 1}{4}$$

$$= 1.505 \times 10^{23}$$

Number of Atoms = 1.505×10^{23} atoms

(ii) 8.8g of Carbondioxide (CO_2)

Data

Mass of carbondioxide = 8.8g

Molecular Mass of carbondioxide = $(1 \times 12) + (2 \times 16) = 12 + 32 = 44g$

Avagadro's Number = $NA = 6.02 \times 10^{23}$

Number of Molecules = ?

Solution

$$Number\ of\ Molecules = \frac{N_A \times Mass\ of\ Substance}{Molecular\ Mass}$$

$$= \frac{6.02 \times 10^{23} \times 8.8}{44}$$

$$= \frac{52.976 \times 10^{23}}{44}$$

$$= 1.204 \times 10^{23}$$

Number of Molecules = 1.204×10^{23} molecules of CO_2

Q.8 Reproduce any two of the following chemical reactions in the form of balanced chemical equations:

(i) Carbon monoxide reacts with Oxygen gas to form Carbon dioxide.

Ans: Balanced Chemical Equation

$$2CO_{(g)} + O_{2(g)} \longrightarrow 2CO_{2(g)}$$

(ii) Zinc metal reacts with Hydrochloric acid to give Zinc chloride and Hydrogen gas.

Ans: Balanced Chemical Equation

$$Zn_{(s)} + 2HCl_{(aq)} \longrightarrow ZnCl_{2(aq)} + H_{2(g)}$$

(iii) Potassium Chlorate decomposes on heating into Potassium Chloride and Oxygen gas.

Ans: Balanced Chemical Equation

$$2KClO_{3(s)} \xrightarrow{Heat} 2KCl_{(s)} + 3O_{2(g)}$$

Q.9 Define the folllowing:

(i) Isotopes (ii) Electronegativity

(iii) Electron Affinity (iv) Polar Bond

Q.10 Define pH and calculate the pH and pOH of 10^{-5} molar solution of HNO_3.

Ans: pH

The negative logarithm of the concentration of hydrogen ions [H+] is called pH of the solution. It is calculated by the following formula,

$pH = -log[H+]$

Data

Concentration of Hydrogen Ions $= [H^+] = 10^{-5}\ mol/dm^3$

pH of Solution = pH = ?

pOH of Solution = pOH = ?

Solution

$$pH = -log[H^+]$$

$$= -log(10^{-5})$$

$$= -(-5)log\,10$$

$$pH = 5 \times 1$$

pH of Solution = 5

$$pH + pOH = 14$$

$$pOH = 14 - pH$$

$$= 14 - 15$$

$$= 11$$

pOH of Solution = 11 Ans

Q.11 What is meant by Soft Wate, Hard Water and Heavy Water? Also give causes of permanent hardness of water.

Q.12 What is allotropy? Describe three allotropric forms of Sulphur.

Q.13 Define the terms:

(i) Homologous Series (ii) Isomerism

(iii) Functional group (iv) Aromatic Compounds

Q.14 A current of 5 Ampere was passed through an electrolytic solution of Copper Sulphate for an hour. Find the mass of Copper metal deposited at the Cathode.

[The Electro Chemical Equivalent of Copper is 0.000329 g/C).

Data

Magnitude of Current = A = 5 amperes

Time = t = 1h = $1 \times 60 \times 60 = 3600$ S

Electrochemical Equivalent = 0.000329g/C

= $3.29 \times 10^{-4} \times 10^{-3}$

= 3.29×10^{-7}kg/C

Mass of Copper Metal Deposited = W = ?

Solution

$$W = ZAt$$

$$= 3.29 \times 10^{-7} \times 5 \times 3600$$

$$W = 59220 \times 10^{-7}$$

$$= 5.922 \times 10^{4} \times 10^{-7}$$

$$W = 5.922 \times 10^{-3} kg$$

$$= 5.922 \times 10^{-3} \times 10^{3}$$

Mass of Copper Metal = 5.922g Ans

Q.15 Write down any four methods of foods preservation.

Q.16 Give reason:

(i) Which gas among CO_2, CH_4 and H_2 will diffuse faster and why?

Ans: Scientific Reason

The rate of diffusion is inversely proportional to the square root of density or molecular mass of a gas. The gas having low molecular mass diffuses faster than a gas having high molecular mass. In given gases H_2 gas has lower molecular mass so it will diffuse faster than CH_4 and CO_2.

(ii) Water filled glass bottles often crack in freezer. Why?

Ans: Scientific Reason

On cooling below 4°C, water expands due to its anomalous expansion. When water is cooled filled in glass bottles in freezer expands it exerts pressure which cracks the glass bottles in freezer.

SECTION "C" DETAILED ANSWER QUESTIONS (Marks: 28)

NOTE: Answer any *TWO* questions form this section. Each question carries 14 marks.

Q.17(a) What is metallurgy? How is Aluminium metal extracted from its Bauxite ore? Describe the process giving balanced chemical equations. Also draw a labelled diagram of the electrolytic cell used in the manufacture of Aluminium.

(b) Define neutralization and describe three different concepts about Acids and Bases with appropriate examples of each.

Q.18(a) What are Oxides? How are they classified? Describe normal oxides in detail.

(b) State the law discovered by French Chemist Lavoster and describe Landolt's exeriment to verify the law with labelled diagram and relevant chemical equation also.

Q.19(a) Define Solubility and describe in detail the factors that affect solubility.

(b) Describe the industrial manufacture of Sulphuric acid by contact process with balanced chemical equations.

Q.20(a) Describe Ammonia-Solvay process for industrial preparation unhydrous Sodium Carbonate with balanced chemical equations also write down its two uses.

(b) What is electroplating? Explain how would you electroplate an Iron spoon with Nickel? Draw a labelled diagram also.