DPP – 8 [Laws of Chemical Combination]

Chapter: Some Basic Concepts of Chemistry

"The difference between average and confident students is assignment completion"

TYPE 1 : Law of Conservation of Mass

Q.1 **$BaCl_2$ reacts with 24.4 g of sodium sulphate to produce 46.6 g of barium sulphate and 23.4 g of sodium chloride. The weight of $BaCl_2$ that reacted is:**
$BaCl_2 + Na_2SO_4 \longrightarrow BaSO_4 + 2NaCl$

(1) 45.6 g (2) 24.4 g (3) 46.6 g (4) 70.0 g

Q.2 **10 g of $CaCO_3$ on heating gives 4.4 g of CO_2. The weight of CaO produced in quintal is:**
$CaCO_3 \longrightarrow CaO + CO_2$

(1) 5.6×10^{-5} quintal
(2) 5.6×10^{-3} quintal
(3) 5.6×10^{-4} quintal
(4) 5.6×10^{-2} quintal

Q.3 **10.0 g of $CaCO_3$ on heating gave 4.4 g of CO_2 and x g of CaO. Applying law of conservation of mass, the mass of CaO is**

(1) 5.6 g (2) 4.4 g (3) 10.0 g (4) 14.4 g

Q.4 **The law of conservation of mass holds good for all of the following except**

(1) All chemical reactions
(2) Nuclear reactions
(3) Endothermic reactions
(4) Exothermic reactions

Q.5 **A chemical equation is balanced according to the law of**

(1) Multiple proportion
(2) Constant composition
(3) Gaseous volume
(4) Conservation of mass

Q.6 **28 g of N_2 and 6 g of H_2 react to give 34 g of NH_3. This statement illustrates the law of** **[NCERT Pg. 14]**

(1) Conservation of mass
(2) Definite proportion
(3) Multiple proportion
(4) Reciprocal proportion

TYPE 2 : Law of Definite Proportions (Constant Composition)

Q.7 **Cu forms two oxides, cuprous and cupric oxides. Which law can be proved by the weights of Cu and O?**

(1) Constant composition
(2) Multiple proportions
(3) Conservation of mass
(4) Definite proportions

Q.8 **Weight of copper oxide obtained by treating 2.16 g of metallic copper with nitric acid and subsequent ignition was 2.70 g. In another experiment, 1.15 g of copper oxide on reduction yielded 0.92 g of copper. The ratio of Cu : O in experiment I and experiment II respectively is**

(1) 4 : 1 in both
(2) 2 : 1 in both
(3) 4 : 1 and 2 : 1
(4) 1 : 4 in both

Q.9 **In an experiment 2.4 g of FeO on reduction with hydrogen gives 1.68 g of Fe. In another experiment 2.9 g of FeO gives 2.03 g of Fe on reduction with hydrogen. The ratio of Fe : O in both experiments is**

(1) 2.33 : 1 in both
(2) 1 : 2.33 in both
(3) 2 : 1 and 3 : 1
(4) Different in both

Q.10 **Copper oxide was prepared by two different methods. In one case, 1.75 g of the metal gave 2.19 g of oxide. In the second case, 1.14 g of the metal gave 1.43 g of the oxide. The law illustrated by this data is**

(1) Law of constant proportions
(2) Law of multiple proportions
(3) Law of conservation of mass
(4) Law of gaseous volumes

TYPE 3 : Law of Multiple Proportions

Q.11 **Hydrogen peroxide (H_2O_2) and water (H_2O) contain 5.93% and 11.2% of hydrogen respectively. The ratio of masses of oxygen that combine with fixed mass (1 g) of hydrogen in H_2O_2 and H_2O is**

(1) 2 : 1 (2) 1 : 2 (3) 1 : 1 (4) 3 : 1

Q.12 **Carbon combines with hydrogen in compounds P, Q and R. The % of hydrogen in P, Q and R are 25, 14.3 and 7.7 respectively. The ratio of carbon in P, Q and R is**

(1) 1 : 2 : 4 (2) 2 : 3 : 4 (3) 1 : 3 : 6 (4) 3 : 6 : 12

Q.13 **Hydrogen and oxygen are known to form two or more compounds. The hydrogen content in one of these is 5.93% while in the other it is 11.2%. The law illustrated by this data is**

(1) Law of multiple proportions
(2) Law of conservation of mass
(3) Law of constant proportions
(4) Law of combining volumes

Q.14 The percentage of hydrogen in water and hydrogen peroxide is 11.1 and 5.9 respectively. These figures illustrate

(1) Law of multiple proportions
(2) Law of conservation of mass
(3) Law of constant proportions
(4) Law of combining volumes

Q.15 Different proportions of oxygen in the various oxides of nitrogen prove the law of

(1) Equivalent proportion
(2) Multiple proportion
(3) Constant proportion
(4) Conservation of matter

Q.16 Oxygen combines with two isotopes of carbon ^{12}C and ^{14}C to form two samples of carbon dioxide. The data illustrates

(1) Law of conservation of mass
(2) Law of multiple proportions
(3) Law of gaseous volume
(4) None of these

Q.17 Which one of the following pairs of compounds illustrates the law of multiple proportions?

(1) H_2O, Na_2O
(2) MgO, Na_2O
(3) Na_2O, BaO
(4) $SnCl_2$, $SnCl_4$

Q.18 Element X forms five stable oxides with oxygen of formula X_2O, XO, X_2O_3, X_2O_4, X_2O_5. The formation of these oxides explains

(1) Law of definite proportions
(2) Law of partial pressures
(3) Law of multiple proportions
(4) Law of reciprocal proportions

Q.19 Which of the following pairs of compound illustrate the law of multiple proportions?

(1) KOH, CsOH
(2) H_2O, D_2O
(3) Ethane, benzene
(4) KCl, KBr

Q.20 The law of multiple proportion was proposed by

(1) Lavoisier (2) Dalton (3) Proust (4) Gaylussac

Q.21 Suppose the elements X and Y combine to form two compounds XY_2 and X_3Y_2. When 0.1 mole of XY_2 weighs 10 g and 0.05 mole of X_3Y_2 weighs 9 g, the atomic weights of X and Y are

(1) 20, 30 (2) 30, 20 (3) 40, 30 (4) 60, 40

TYPE 4 : Gay-Lussac's Law of Gaseous Volumes

Q.22 For the gaseous reaction: $H_{2(g)} + Cl_{2(g)} \longrightarrow 2HCl_{(g)}$. If 40 mL of hydrogen completely reacts with chlorine, the required volume of Cl_2 and volume of produced HCl are

(1) 40 mL Cl_2 and 80 mL HCl
(2) 20 mL Cl_2 and 40 mL HCl
(3) 80 mL Cl_2 and 40 mL HCl
(4) 40 mL Cl_2 and 40 mL HCl

Q.23 For the gaseous reaction: $H_{2(g)} + Cl_{2(g)} \longrightarrow 2HCl_{(g)}$. Initially 20 mL of $H_{2(g)}$ and 30 mL of $Cl_{2(g)}$ are present. The volume of $HCl_{(g)}$ produced and unreacted Cl_2 are

(1) 40 mL HCl and 10 mL Cl_2
(2) 20 mL HCl and 10 mL Cl_2
(3) 60 mL HCl and 0 mL Cl_2
(4) 40 mL HCl and 20 mL Cl_2

Q.24 In the reaction $N_2 + 3H_2 \longrightarrow 2NH_3$, the ratio by volume of N_2, H_2 and NH_3 is 1 : 3 : 2. This illustrates the law of

(1) Definite proportion
(2) Multiple proportion
(3) Law of conservation of mass
(4) Gaseous volumes

TYPE 5 : Avogadro's Law

Q.25 Which of the following represents Avogadro's hypothesis?

(1) Gases react together in volumes which bear a simple ratio to one another
(2) Equal volumes of all gases under same conditions of temperature and pressure contain equal number of molecules
(3) Equal volumes of all gases under same conditions of temperature and pressure contain equal number of atoms
(4) The rates of diffusion of gases are inversely proportional to the square root of their densities

Q.26 Equal volume of different gases at any definite temperature and pressure have

(1) Equal atoms
(2) Equal masses
(3) Equal densities
(4) Equal molecules

Q.27 Number of molecules in 100 mL of each of O_2, NH_3 and CO_2 at STP are

(1) In the order $CO_2 < O_2 < NH_3$
(2) In the order $NH_3 < O_2 < CO_2$
(3) The same
(4) $NH_3 = CO_2 < O_2$

Q.28 Two flasks A and B of equal capacity of volume contain NH_3 and SO_2 gas respectively under similar conditions. Which flask has more number of moles?

(1) A
(2) B
(3) Both have same moles
(4) None

Q.29 Four one litre flasks are separately filled with the gases hydrogen, helium, oxygen and ozone at same room temperature and pressure. The ratio of total number of atoms of these gases present in the different flasks would be

(1) 1 : 1 : 1 : 1
(2) 1 : 2 : 2 : 3
(3) 2 : 1 : 2 : 3
(4) 2 : 1 : 3 : 2

Q.30 A container of volume V contains 0.28 g of N_2 gas. If same volume of an unknown gas under similar conditions of temperature and pressure weighs 0.44 g, the molecular mass of the gas is

(1) 22
(2) 44
(3) 66
(4) 88

Q.31 A and B are two identical vessels. A contains 15 g ethane at 1 atm and 298 K. The vessel B contains 75 g of a gas X_2 at same temperature and pressure. The vapour density of X_2 is

(1) 75
(2) 150
(3) 37.5
(4) 300