



## DPP – 6 [Empirical Formula]

### Chapter: Some Basic Concepts of Chemistry

*“The difference between average and confident students is assignment completion”*

#### TYPE 1: Empirical Formula from % Composition

**Q.1 Empirical formula of glucose is**

- (1)  $C_6H_{12}O_6$                       (2)  $C_3H_6O_3$                       (3)  $C_2H_4O_2$                       (4)  $CH_2O$

**Q.2 Which of the following compounds has same empirical formula as that of glucose?**

- (1)  $CH_3CHO$                       (2)  $CH_3COOH$                       (3)  $CH_3OH$                       (4)  $C_2H_6$

**Q.3 In a compound x is 75.8% and y is 24.2% by weight present. If atomic weight of x and y are 24 and 16 respectively, then the empirical formula of the compound is**

- (1)  $x_2y$                               (2)  $xy$                               (3)  $x_2y_3$                               (4)  $xy_2$

**Q.4 Two elements X (Atomic weight = 75) and Y (Atomic weight = 16) combine to give a compound having 75.8% of X. The empirical formula of compound is**

- (1)  $XY$                               (2)  $X_2Y$                               (3)  $X_2Y_2$                               (4)  $X_2Y_3$

**Q.5 In a compound, element A (Atomic weight = 12.5) is 25% and element B (Atomic weight = 37.5) is 75% by weight. The empirical formula of the compound is**

- (1)  $AB$                               (2)  $A_2B$                               (3)  $A_2B_2$                               (4)  $A_2B_3$

**Q.6 A compound of X and Y has equal mass of them. If their atomic weights are 30 and 20 respectively. Molecular formula of the compound is**

- (1)  $X_2Y_2$                               (2)  $X_3Y_3$                               (3)  $X_2Y_3$                               (4)  $X_3Y_2$

**Q.7 The simplest formula of a compound containing 50% of element X (at. wt. = 10) and 50% of element Y (at. wt. = 20) is**

- (1)  $XY$                               (2)  $X_2Y$                               (3)  $XY_2$                               (4)  $X_3Y$

**Q.8 A hydrocarbon contains 80% C. The vapour density of compound is 30. Empirical formula of compound is**

- (1)  $\text{CH}_3$                       (2)  $\text{C}_2\text{H}_6$                       (3)  $\text{C}_4\text{H}_{12}$                       (4)  $\text{C}_4\text{H}_8$

**Q.9** A hydrocarbon contains 80% of carbon, then the hydrocarbon is

- (1)  $\text{CH}_4$                       (2)  $\text{C}_2\text{H}_4$                       (3)  $\text{C}_2\text{H}_6$                       (4)  $\text{C}_2\text{H}_2$

**Q.10** An oxide of sulphur contains 50% of sulphur in it. Its empirical formula is

- (1)  $\text{SO}_2$                       (2)  $\text{SO}_3$                       (3)  $\text{SO}$                       (4)  $\text{S}_2\text{O}$

**Q.11** An oxide of metal M has 40% by mass of oxygen. Metal M has atomic mass of 24. The empirical formula of the oxide is

- (1)  $\text{M}_2\text{O}$                       (2)  $\text{M}_2\text{O}_3$                       (3)  $\text{MO}$                       (4)  $\text{M}_3\text{O}_4$

**Q.12** A compound contains 38.8% C, 16.0% H and 45.2% N. The formula of the compound would be

- (1)  $\text{CH}_3\text{NH}_2$                       (2)  $\text{CH}_3\text{CN}$                       (3)  $\text{C}_2\text{H}_5\text{CN}$                       (4)  $\text{CH}_2(\text{NH})_2$

**Q.13** An organic compound contains carbon, hydrogen and oxygen. Its elemental analysis gives 38.71% of C and 9.67% of H. The empirical formula of the compound would be

- (1)  $\text{CHO}$                       (2)  $\text{CH}_4\text{O}$                       (3)  $\text{CH}_3\text{O}$                       (4)  $\text{CH}_2\text{O}$

**Q.14** An organic compound containing C, H and N gave the following analysis C = 40%, H = 13.33%, N = 46.67%. Its empirical formula would be

- (1)  $\text{CH}_4\text{N}$                       (2)  $\text{CH}_5\text{N}$                       (3)  $\text{C}_2\text{H}_7\text{N}_2$                       (4)  $\text{C}_2\text{H}_7\text{N}$

**Q.15** An organic compound is composed of 4.58% H, 40.92% C and 54.50% oxygen. What would be the empirical formula of the compound?

- (1)  $\text{C}_3\text{H}_4\text{O}_3$                       (3)  $\text{C}_4\text{H}_8\text{O}$   
(2)  $\text{C}_3\text{H}_5\text{O}$                       (4)  $\text{CH}_2\text{O}$

**Q.16** An organic compound containing C and H gave the following analysis C = 40%, H = 6.7%. Its empirical formula would be

- (1)  $\text{CH}_4$                       (2)  $\text{CH}_2\text{O}$                       (3)  $\text{C}_2\text{H}_4\text{O}_2$                       (4)  $\text{C}_2\text{H}_4$

**Q.17** A gas is found to contain 2.34 g of Nitrogen and 5.34 g of oxygen. Simplest formula of the compound is

- (1)  $\text{N}_2\text{O}$                       (2)  $\text{NO}$                       (3)  $\text{N}_2\text{O}_3$                       (4)  $\text{NO}_2$

**Q.18** 2.2 g of a compound of phosphorous and sulphur has 1.24 g of 'P' in it. Its empirical formula is

- (1)  $\text{P}_2\text{S}_3$                       (2)  $\text{P}_3\text{S}_2$                       (3)  $\text{P}_3\text{S}_4$                       (4)  $\text{P}_4\text{S}_3$

**Q.19** On analysis, a certain compound was found to contain iodine and oxygen in the ratio of 254:80. The formula of the compound is: (At. mass I = 127, O = 16)

- (1)  $\text{IO}$                       (2)  $\text{I}_2\text{O}$                       (3)  $\text{I}_5\text{O}_2$                       (4)  $\text{I}_2\text{O}_5$

**Q.20** The number of atoms of Cr and O are  $4.8 \times 10^{10}$  and  $9.6 \times 10^{10}$  respectively. Its empirical formula is

- (1)  $\text{Cr}_2\text{O}_3$                       (2)  $\text{CrO}_2$                       (3)  $\text{Cr}_2\text{O}_4$                       (4)  $\text{CrO}_5$

### TYPE 2 : Molecular Formula from Empirical Formula

**Q.21** Empirical formula of a compound is  $\text{CH}_2\text{O}$ . The molecular formula of the compound cannot be

- (1)  $\text{CH}_2\text{O}$                       (3)  $\text{C}_{12}\text{H}_{22}\text{O}_{11}$   
(2)  $\text{C}_6\text{H}_{12}\text{O}_6$                       (4)  $\text{CH}_3\text{COOH}$

**Q.22** What is the simplest formula of the compound which has Carbon 80%, Hydrogen 20%? If the molecular mass is 30, the molecular formula is

- (1)  $\text{CH}_3$  and  $\text{C}_2\text{H}_6$                       (3)  $\text{CH}_4$  and  $\text{CH}_4$   
(2)  $\text{CH}_2$  and  $\text{C}_2\text{H}_4$                       (4)  $\text{CH}$  and  $\text{C}_2\text{H}_2$

**Q.23** In a compound Carbon is 52.2%, Hydrogen is 13%, Oxygen is 34.8% and molecular mass of the compound is 92. The molecular formula of the compound is

- (1)  $\text{C}_2\text{H}_6\text{O}$                       (2)  $\text{C}_4\text{H}_{12}\text{O}_2$                       (3)  $\text{C}_2\text{H}_6\text{O}_2$                       (4)  $\text{C}_4\text{H}_{12}\text{O}$

**Q.24** An organic compound on analysis was found to contain 71.7% of chlorine, 4.04% of hydrogen and rest is carbon. If its molecular weight is 99, calculate molecular formula

- (1)  $\text{CHCl}_3$                       (2)  $\text{C}_2\text{H}_4\text{Cl}_2$                       (3)  $\text{C}_2\text{H}_2\text{Cl}_2$                       (4)  $\text{CH}_3\text{Cl}$

**Q.25** A compound on analysis gave: C = 54.54%, H = 9.09% and vapour density of the compound = 88. The molecular formula of the compound is

- (1)  $C_2H_4O$                       (2)  $C_4H_8O$                       (3)  $C_8H_{16}O_4$                       (4)  $C_6H_{12}O_3$

**Q.26** Percentage composition of an organic compound is: C = 10.06, H = 0.84, Cl = 89.10. Which of the following corresponds to its molecular formula if the vapour density is 60.0?

- (1)  $CH_2Cl_2$                       (2)  $CHCl_3$                       (3)  $CH_3Cl$                       (4) None

**Q.27** 1 L of a hydrocarbon weighs as much as 1 L of  $CO_2$  under similar conditions. The molecular formula of the hydrocarbon is

- (1)  $C_3H_8$                       (2)  $C_2H_6$                       (3)  $C_2H_4$                       (4)  $C_3H_6$

**Q.28** The empirical formula of an organic compound containing carbon and hydrogen is  $CH_2$ . The mass of one litre of this organic gas is exactly equal to that of one litre of  $N_2$  at same temperature and pressure. Therefore, the molecular formula of the organic gas is

- (1)  $C_2H_4$     (3)  $C_6H_{12}$   
(2)  $C_3H_6$     (4)  $C_4H_8$

**Q.29** A metal chloride contains 55.0% of chlorine by weight. 100 mL vapours of the metal chloride at STP weigh 0.57 g. The molecular formula of the metal chloride is  
(Given: Atomic mass of chlorine is 35.5 u) [JEE 2023 (12 Apr Shift 1)]

- (1)  $MCl_4$                       (2)  $MCl_3$                       (3)  $MCl_2$                       (4)  $MCl$

**Q.30** Number of hydrogen atoms per molecule of a hydrocarbon A having 85.8% carbon is \_\_\_\_\_.  
(Given: Molar mass of A =  $84 \text{ g mol}^{-1}$ )

- (1) 12                      (2) 6                      (3) 8                      (4) 10

**Q.31** A gaseous hydrocarbon on combustion gives 0.72 g of water and 3.08 g of  $CO_2$ . The empirical formula of the hydrocarbon is

- (1)  $C_2H_4$                       (2)  $C_3H_4$                       (3)  $C_6H_6$                       (4)  $C_7H_8$

**Q.32** An organic compound having molecular mass 60 is found to contain 20% of C, 6.67% of H and 46.67% of O, while rest is nitrogen. On heating it gives  $NH_3$  along with a solid residue. The solid residue gives violet colour with alkaline copper sulphate solution. The compound is

- (1)  $(NH_2)_2CO$     (3)  $CH_3NCO$   
(2)  $CH_3CH_2CONH_2$     (4)  $CH_3CONH_2$