

Some Basic Concepts of Chemistry

1. Express the following by exponential notation :
 - (i) 0.004687 (having 3 significant figures)
 - (ii) 0.0089375 (having 4 significant figures)
 - (iii) 20385 (having 4 significant figures)
 - (iv) 75600 (having 7 significant figures)
2. State the following :
 - (i) Law of constant composition (ii) Law of multiple proportions (iii) Gay Lussac's Law of Gaseous volumes.
3. Two oxides of nitrogen contain the following percentage compositions :
 - (i) Oxide A contains 63.64 % nitrogen and 36.36% of oxygen.
 - (ii) Oxide B contains 46.67% nitrogen and 53.33% of oxygen.Establish the Law of multiple proportions.
4. 6.488g of lead combine directly with 1.002g of oxygen to form lead peroxide (PbO_2). Lead peroxide is also produced by heating lead nitrate and it was found that the percentage of oxygen present in lead peroxide is 13.38 percent. Use these data to illustrate the law of constant composition.
5. State Law of reciprocal proportions. 61.8g of A combine with 80g of B. 30.9g of A combine with 106.5g of C. B and C combine to form compound CB_2 . Atomic weights of C and B are respectively 35.5 and 6.6 . Show that the Law of reciprocal proportions is obeyed.
6. Define the following terms :
 - (i) mole (ii) Molarity (iii) Molality (iv) Mole-fraction (v) Percentage [(a) by mass (m/m) (b) by volume (v/v) (c) by (m/v)] (vi) Parts per million (vii) Limiting reagent.
7. Calculate mass of the following (in gram) :
 - (i) 1 u (ii) 1 atom of Ca. (iii) 1 molecule of SO_2 . (iv) 1 carbonate (CO_3^{2-}) ion. (v) 5 g-atom of Cu. (vi) 7 g-molecule of SO_2 . (vii) 2.5 g-ion of NO_3^- ion. (viii) 3 moles of $\text{C}_6\text{H}_{12}\text{O}_6$.
8. Calculate volume of the following at S.T.P. :
 - (i) 0.5 mole of CO_2 . (ii) 3.011×10^{26} molecules of SO_2 . (iii) 3.5 g-molecule of O_2 . (iv) 6 Kg of H_2
9. Calculate no. of atoms and g-atoms of each element in 29.4g of H_3PO_4 .
10. 9.7×10^{17} atoms of Fe weigh as much as 1 cm^3 of H_2 at S.T.P. What is the atomic mass of

iron ?

11. Concentrated aqueous sulphuric acid is 80% H_2SO_4 by mass and has a density of 1.65gcm^{-3} . Calculate molarity, molality and mole-fraction of H_2SO_4 . What volume of conc. H_2SO_4 will be needed to prepare 5.0 L of 1.5M H_2SO_4 solution ?
12. The density of 3M NaCl solution is 1.25gml^{-1} . Calculate molality of the solution.
13. Calculate no. of moles and molecules of glucose in 250cm^3 of 2.5M $\text{C}_6\text{H}_{12}\text{O}_6$ aqueous solution.
14. Calculate percentage of S in $(\text{NH}_4)_2\text{SO}_4$.
15. An organic liquid having carbon, hydrogen nitrogen and oxygen was found to contain C = 41.37% ; H = 5.75% ; N = 16.09% and the rest oxygen. Calculate molecular formula of the liquid if its V.D. is 43.3 .
16. Butyric acid contains only C, H and O. A 4.24 mg sample of butyric acid is completely burnt. It gives 8.45mg of CO_2 and 3.46mg of H_2O . The molecular mass of butyric acid was determined by experiment to be 88u. What is its molecular formula ?
17. A crystalline salt on being rendered anhydrous loses 45.6% of its weight. The percentage composition of the anhydrous salt is :
Al = 10.50% ; K = 15.1% ; S = 24.96% ; O = 49.92%.
Find the simplest formula of the anhydrous and crystalline salt.
18. 40g of N_2 reacts with 10g of H_2 to form NH_3 according to the reaction :
$$\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \rightarrow 2\text{NH}_3(\text{g})$$
 - (i) Which is limiting reagent ?
 - (ii) Calculate the maximum amount of NH_3 formed.
 - (iii) Calculate the amount of reactant unreacted.
19. 500cm^3 1.5M NaCl solution is treated with 600cm^3 of 0.75M AgNO_3 solution. Which is the limiting reactant ? Calculate no. of moles and mass of AgCl precipitated.
20. Naturally occurring Boron consists of two isotopes whose atomic masses are 10.01 and 11.01 . The atomic mass of natural Boron is 10.81 . Calculate the percentage of each

isotope in natural Boron.

21. Calculate molality of H_2SO_4 in its aqueous solution if mole-fraction of water is 0.75 .
22. Calculate mole-fraction of water in 5m H_2SO_4 solution.
23. Solve all NCERT intext and exercises questions of Unit-1.