CHAPTER 1

Some Basic Concepts of Chemistry

Significant Figures, Laws of Chemical Combinations

1. Equal masses of H_2, O_2 and methane have been taken in a container of volume V at temperature 27°C in identical conditions. The ratio of the volumes of gases H_2 : O_2 : methane would be: *(2014)*

a. 8 : 16 : 1 b. 16 : 8 : 1

c. 16 : 1 : 2 d. 8 : 1 : 2

Atomic and Molecular Masses

2. 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: *(2016)*

a. 20, 30 b. 30, 20

c. 40, 30 d. 60, 40

Mole Concept and Molar Masses

3. Which one of the followings has maximum number of atoms? *(2020)*

a. 1 g of Mg(s) [Atomic mass of Mg = 24]

b. 1 g of O_2(g) [Atomic mass of O = 16]

c. 1 g of Li(s) [Atomic mass of Li = 7]

d. 1 g of Ag(s) [Atomic mass of Ag = 108]

4. One mole of carbon atom weighs 12g, the number of atoms in it is equal to. *(2020-Covid)*

(Mass of carbon- 12 is 1.9926×10^{-23} g)

a. 6.022×10^{22} b. 12×10^{22}

c. 6.022×10^{23} d. 12×10^{23}

5. In which case is number of molecules of water maximum? *(2018)*

a. 18 mL of water

b. 0.18 g of water

c. 10^{-3} mol of water

d. 0.00224 L of water vapours at 1 atm and 273 K

6. A mixture of gases contains H_2 and O_2 gases in the ratio of 1 : 4 (w/w). What is the molar ratio of the two gases in the mixture? *(2015)*

a. 16 : 1 b. 2 : 1

c. 1 : 4 d. 4 : 1

7. The number of water molecules is maximum in: *(2015 Re)*

a. 18 moles of water b. 18 molecules of water

c. 1.8 gram of water d. 18 gram of water

8. If Avogadro number N_A, is changed from 6.022×10^{23} mol^{-1} to 6.022×10^{20} mol^{-1}, this would change: *(2015 Re)*

a. The ratio of elements to each other in a compound

b. The definition of mass in units of grams

c. The mass of one mole of carbon

d. The ratio of chemical species to each other in a balanced equation

Percentage Composition, Empirical & Molecular Formula

9. An organic compound contains 78% (by wt.) carbon and remaining percentage of hydrogen. The right option for the empirical formula of this compound is: [Atomic wt. of C is 12, H is 1] *(2021)*

a. CH_2 b. CH_3

c. CH_4 d. CH

Stoichiometry and Stoichiometric Calculations

10. The number of moles of hydrogen molecules required to produce 20 moles of ammonia through Haber's process is: *(2019)*

a. 10 b. 20

c. 30 d. 40

11. A mixture of 2.3 g formic acid and 4.5 g oxalic acid is treated with concentration H_2SO_4. The evolved gaseous mixture is passed through KOH pellets. Weight (in g) of the remaining product at STP will be: *(2018)*

a. 1.4 b. 3.0

c. 4.4 d. 2.8

12. What is the mass of the precipitate formed when 50 mL of 16.9% solution of $AgNO_3$ is mixed with 50 mL of 5.8% NaCl solution?

(Ag = 107.8, N = 14, O = 16, Na = 23, Cl = 35.5) *(2015 Re)*

a. 3.5 g b. 7 g

c. 14 g d. 28 g

13. 20.0 g of a magnesium carbonate sample decomposes on heating to give carbon dioxide and 8.0 g magnesium oxide. What will be the percentage purity of magnesium carbonate in the sample? *(2015 Re)*

(Atomic weight of Mg = 24)

a. 96 b. 60

c. 84 d. 75

14. When 22.4 litres of $H_2(g)$ is mixed with 11.2 litres of $Cl_2(g)$, each at STP, the moles of HCl(g) formed is equal to: *(2014)*

a. 2 mol of HCl(g) b. 0.5 mol of HCl(g)

c. 1.5 mol of HCl(g) d. 1 mol of HCl(g)

15. 1.0 g of magnesium is burnt with 0.56 g O_2 in a closed vessel. Which reactant is left in excess and how much? *(2014)*

(Atomic weight Mg = 24; O = 16)

a. O_2, 0.16 g b. Mg, 0.44 g

c. O_2, 0.28 g d. Mg, 0.16 g

Concentration Terms

16. What mass of 95% pure $CaCO_3$ will be required to neutralise 50 mL of 0.5 M HCl solution according to the following reaction? *(2022)*

$CaCO_{3(s)} + 2HCl_{(aq)} \rightarrow CaCl_{2(aq)} + CO_{2(g)} + 2H_2O_{(l)}$

[Calculate upto second place of decimal point]

a. 9.50 g b. 1.25 g

c. 1.32 g d. 3.66 g

17. 6.02×10^{20} molecules of urea are present in 100 mL of its solution. The concentration of solution is: *(2013)*

a. 0.02 M b. 0.01 M

c. 0.001 M d. 0.1 M

18. An excess of $AgNO_3$ is added to 100 mL of a 0.01 M solution of dichlorotetraaquachromium(III) chloride. The number of moles of AgCl precipitated would be: *(2013)*

a. 0.001 b. 0.002

c. 0.003 d. 0.01

19. How many grams of concentrated nitric acid solution should be used to prepare 250 mL of 2.0 M HNO_3? The concentrated acid is 70 % HNO_3: *(2013)*

a. 45.0 g conc. HNO_3 b. 90.0 g conc. HNO_3

c. 70.0 g conc. HNO_3 d. 54.0 g conc. HNO_3

Answer Key

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
c	c	c	c	a	d	a	c	b	c	d	b	c	d	d	c	b

18	19
a	a