|  |
| --- |
| **Karan Arora** **R.L. Chemistry Classes M: 99968-68554**  **Class : XI**  **“SOME BASIC CONCEPTS OF CHEMISTRY”** |

**Assignment – I**

1. How many atoms and molecules of sulphur are present in 64.0 gm of sulphur (S8)?
2. What is the mass in grams of 0.25 mol copper? Cu = 63.5 amu.
3. What is the mass in grams of 0.15 mol of nitrogen dioxide (NO2)? N = 14; O = 16
4. Calculate the number of atoms in each of the following:

a) 0.5 mole molecules of nitrogen b) 0.8 mole atoms of helium

c) 0.26 mole molecules of sulphur (S8)

1. How many moles are there in one atom?
2. How many moles of gold are there in 49.25 gm gold rod? At. mass of gold = 197 a.m.u.
3. A sample of phosphorus has 0.25 moles of P4 molecules

a) How many P4 molecules are there? b) How many P atoms are there?

c) How many moles of P atoms are there in the sample?

d) What is the mass of the sample?

1. Calculate the number of moles in the following:

a) 7.85 gm of iron b) 4.68 mg of silicon c) 65.6 μg of carbon

1. Calculate the number of atoms in each of the following:

a) 52 mol of Ar b) 52 amu of He c) 52 g of He

1. How many moles, no. of atoms and no. of protons are in 360 gm glucose (C6H12O6).
2. How many H atoms are present in 25.6 gm of urea [(NH2)2 (CO)] having molar mass of 60 g/mol?
3. How many oxygen atoms are there in 6.025 g Ba3(PO4)2? Ba = 137.5; P = 31; O = 16
4. A sample of sodium hydroxide contains 2.5 x 1010 molecules. What is the mass of this sample?
5. Calculate the number of atoms present in 5.6 litres of a

a) monoatomic and b) diatomic gas at NTP

1. The volume of a gas is 1.12 x 10-7 cm3 at NTP. Calculate the number of molecules of the gas.
2. 16.26 mg of a sample of an element X contains 1.66 x 1020 atoms. What is the atomic mass of the element, X?
3. The mass of an atom X is 3.155 x 10-22 g. what is atomic mass of the element X in atomic mass unit?
4. A sample of nitrogen contains 2.8 x 1019 atoms of nitrogen. What is the mass of this collection of atoms? The atomic-mass of nitrogen is 14 amu
5. What is the molecular mass of a compound, X, if its 3.0115 x 109 molecules weight 1.0 x 10-12 g?
6. A sample of Vitamin C is known to contain 1.29 x 1024 hydrogen atoms and 2.58 x 1024 oxygen atom. How many moles of hydrogen and oxygen atoms are present in the sample?

SOME BASIC CONCEPT OF CHEMISTRY Page No. 1

1. The volume of a drop of water is 0.04 ml. How many H2O molecules are there in a drop of water?
2. From 200mg of CO2, 1021 molecules are removed. How many moles of CO2 are left?
3. The measured density at NTP of He is 0.1784 g/l. what is the weight of 1 moles?
4. A metal M of atomic weight 54.94 has a density of 7.42 g/cc. Calculate the apparent volume occupied by one atom of the metal.
5. Calculate the mass of: (a) an atom of silver (b) a molecule of carbon dioxide.
6. Calculate the number of atoms of the constituent elements in 53g of Na2CO3.
7. Calculate the mass of :

a) 0.1 mole of KNO3 b) 1 x 1023 molecules of methane c) 112cm3 of hydrogen at STP

1. Arrange the following in order of their increasing masses in grams?

a) One atom of silver b) One gram-atom of nitrogen c) One mole of calcium

d) One mole of oxygen molecules e) 1023 atoms of carbon f) One gram of iron

1. What is the mass in grams of:

a) 6.022 x 1023 atoms of oxygen? b) 1.0 x 1023 molecules of H2S?

c) 6.022 x 1023 molecules of oxygen? d) 1.5 moles of H2SO4?

1. Which of the following weights most:

a) 50g of iron b) 5g atoms of nitrogen

c) 0.1g atom of silver d) 1 x 1023 atoms of carbon

1. Calculate the mass of CO2 which contains the same number of molecules as are contained in 40g of oxygen
2. Calculate the mass of Na2CO3 which will have the same number of molecules as contained in 12.3g of MgSO4. 7H2O?
3. Find the number of atoms of each type present in 3.42 grams of cane sugar (C12H22O11)?
4. How many atoms and molecules of phosphorus are present in 124g of phosphorus (P4)?
5. What is the mass of a water molecule in gram? How many molecules are present in one drop of pure water which weighs 0.05 g. If the same drop of water evaporates in one hour, calculate the number of molecules leaving the liquid surface per second.
6. What is the mass of carbon present in 0.5 mole of K4[Fe(CN)6]?
7. The cost of table salt (NaCl) and table sugar (C12H22O11) is Rs. 2 per kg and Rs. 6 per kg respectively. Calculate their costs per mole?
8. Chlorophyll, the green colouring matter of plants responsible for photosynthesis, contains 2.68% of magnesium by weight. Calculate the number of magnesium atoms in 2.0 gm of chlorophyll?
9. Calculate the total number of electrons present in 1.4g of nitrogen gas?
10. Calculate the number of molecules present
11. In 34.2 grams of cane sugar (C12H22O11)
12. In one litres of water assuming that the density of water is 1g/cm3
13. Calculate the number of molecules present in 350 cm3 of NH3 gas at 273 K and 2 atmosphere pressure?
14. Calculate the volume occupied by 1022 molecules of a gas at 300 K and 760 mm pressure?

SOME BASIC CONCEPT OF CHEMISTRY Page No. 2

1. The mass of 350 cm3 of a diatomic gas at 273 K at 2 atmospheres pressure is one gram. Calculate the mass of one atom of the gas.
2. Calculate the volume at STP occupied by :

a) 14g of nitrogen b) 1.5 moles of carbon dioxide c) 1021 molecules of oxygen

1. a) Assuming the density of water to be 1g/cm3, calculate the volume occupied by one molecule of water.

b) Assuming the water molecule to be spherical, calculate diameter of the water molecule

**Answers**

1. 1.2 x 1024 , 1.5 x 1023 2. 15.875 3. 6.9

4. a) 6.02 x 1023 atoms of N2 b) 4.82 x 1023 atoms of He c) 12.53 x 1023 atoms of S8

5. 1.66 x 10-24 mol 6. 0.25 mol

7. a) 1.5 x 1023 b) 6.02 x 1023 P atoms c) 1 mol d) 31g

8. a) 0.141 mol b) 1.66 x 10-4 mol c) 5.47 X 10-6 mol

9. a) 3.13 x 1025 atoms b) 13 atoms c) 7.83 X 1024 atom

10. 2, 289 x 1023, 1156.4 x 1023 11. 1.02 x 1024 H atoms 12. 4.81 x 1022 oxygen atoms

13. 1.66 x 10-12 gram 14. 1.5 x 1023, 2 x 1.5 x 1023 15. 3 x 1012 molecules

16. 59 amu 17. 190 amu 18. 6.5 x 10-4 g

19. 200 amu 20. 2.14, 4.28 mol 21. 1.33 x 1021 molecules

22. 0.00288 23. ≈ 4g/mole 24. 1.23 x 10-23cc

25. a) 1.793 x 10-22 gm b) 7.3 x 10-23 gm

26. a) 6.022 x 1023 Na+ ions b) 3.011 x 1023 C – atoms c) 9.033 x 1023 O – atoms

27. a) 10.1 gm b) 2.657 gm c) 0.01 gm 28. (c)>(d)>(b)>(e)>(f)>(a)

29. a) 16 gm b) 5.645 gm c) 32 g d) 147 g

30. (b) 31. 55gm 32. 5.3 gm

33. C = 7.226 x 1022 atoms, H = 1.325 x 1023 atoms, O = 6.624 x 1022 atoms

34. 24.088 x 1023 atoms, 6.022 x 1023 molecule

35. a) 2.989 x 10-23 gm b) 1.673 x 1021 molecule c) 4.647 x 1017 molecule/sec

36. 36gm 37. Salt = 12 Paise, Sugar = 2.05 Rupees 38. 1.345 x 1021

39. 4.2 x 1023 electrons 40. a) 6.02 x 10 22 molecule b) 3.346 x 10 25 molecule

41. 1.88 x 1022 molecule 42. 408.9 cm3 43. 2.657 x 10 -23 gm

44. a) 11.2 litres at STP b) 33.6 litres at STP c) 37.2 cm3 at STP

45. a) 2.989 x 10-23 cm3 b) 3.85 x 10-8 cm

SOME BASIC CONCEPT OF CHEMISTRY Page No. 3

**Karan Arora** **M: 99968-68554**

**Assignment – II**

1. Naturally occurring Boron consist of 2 isotopes whose atomic weights are 10.01 and 11.01. The atomic weight of natural Boron is 10.81. Calculate the percentage of each isotope in natural Boron.
2. Taking N2 and O2 as main components of the air ( 79% N2, 21% O2 by volume ). What is the molecular mass of air ? How has it been arrived at?
3. Calculate the percentage of the naturally occurring isotopes 35Cl and 37Cl that accounts for the atomic mass of chlorine taken as 35.45.
4. Calculate the molar mass of water if it contains 50% heavy water (D2O).

**Answers**

1. 20% 2. 28.84 amu 3. 35Cl = 77.5%, 37Cl = 22.5% 4. 19 g/mole

SOME BASIC CONCEPT OF CHEMISTRY Page No. 4

**Karan Arora** **M: 99968-68554**

**Assignment – III**

1. In the commercial manufacture of nitric acid, how many moles of NO2 produce 7.33 mol of HNO3 in the reaction: 3NO2 (g) + H2O (l) → 2 HNO3 (aq) + NO (g)?
2. How much of Fe can be theoretically obtained by the reduction of 1 Kg of Fe2O3?
3. Calculate the amount of water (g) produced by the combustion of 16 g methane?
4. How much moles of methane are required to produce 22 g CO2 (g) after combustion?
5. Calculate the mass of 60% of H2SO4 required to decompose 50 g of chalk (calcium carbonate)?
6. Which is cheaper: 40% hydrochloric acid at the rate of 50 paise per kg or 80% H2SO4 at the rate of 25 paise per kg to completely neutralize 7 kg of caustic potash?
7. A sample of dolomite contained 45% of CaCO3, 40% of MgCO3 and 15 % clay. Calculate the mass of sulphuric acid of 30% strength required to react completely with 10 g sample.
8. Calculate the mass of iron which will be converted into its oxide (Fe3O4) by the action of 18 g of steam on it.
9. What mass of slaked lime would be required to decompose completely 4 grams of ammonium chloride and what would be the mass of each product?
10. Current market prices of Al, Zn and Fe scraps per kg are Rs.20, Rs.16, Rs.3 respectively. If H2 is to be prepared by the reaction of one of the metals with H2SO4, which would be the cheapest metal to use, which would be most expensive?
11. In order to find the strength of a sample of sulphuric acid, 10g were diluted with water and a piece of marble weighing 7g placed in it. When all action has ceased, the marble was removed, washed, dried and was found to weighs 2.2 gm. What was the percentage strength of sulphuric acid?
12. Calculate the amount of lime, Ca(OH)2, required to remove hardness of 50,000 litres of well water which has been found to contain 1.62 g of calcium bicarbonate per 10 litre?
13. Excess of AgNO3 solution was added to 2.2 g of commercial sample of common salt dissolved in water. The mass of dried precipitate of silver chloride was 2.11 g. Calculate the percentage purity of common salt.
14. 1.5g of an impure sample of sodium sulphate dissolved in water was treated with excess of barium chloride solution when 1.74g of BaSO4 were obtained as dry precipitate. Calculate the percentage purity of the sample .
15. Calculate the mass of graphite that must be burnt to produce 13.2 g of CO2.
16. 1.84g of a mixture of CaCO3 and MgCO3 is strongly heated till no further loss of mass takes place. The residue weighs 0.96 g. Calculate the percentage composition of the mixture.
17. One gm of a mixture of potassium and sodium chloride on treatment with excess of silver nitrate gave 2g of AgCl. What was the composition of the two salts in the original mixture?
18. What volume of CO2 measured at 27˚C and 746.7 mm pressure would be obtained by treating 10 g of pure marble with dilute hydrochloric acid ? (Aq. Tension at 27˚C is 26.7 mm).

SOME BASIC CONCEPT OF CHEMISTRY Page No. 5

1. 1g of a mixture of a carbonates of calcium and magnesium gave 240 cm3 of CO2 at STP. Calculate the percentage composition of the mixture.
2. What volume of oxygen at 18˚C and 750 mm pressure can be obtained from 10g of potassium chlorate?
3. What mass of iodine is liberated from a solution of potassium iodide when 1 litre of chlorine gas at 10 ˚C and 750 mm pressure is passed through it?
4. 1.4g of sample of chalk (CaCO3) containing clay as impurity were treated with excess of dilute hydrochloric acid. Volume of CO2 evolved when measured at 15 ˚C and 768 mm pressure was 282 cm3. Calculate the percentage purity of the sample.
5. How much marble of 96.5% purity would be required to prepare 10 litres of carbon dioxide at STP, when marble is acted upon by dilute hydrochloric acid?
6. Calculate the volume of SO2 at STP obtained by burning 500 g of S containing 4% sand by weight.
7. 2.5 g sample of sodium bicarbonate when strongly heated gave 300cm3 of CO2 measured at 27 ˚C and 760 mm pressure. Calculate the percentage purity of the sample.
8. 10ml of liquid carbon disulphide (specific gravity = 2.63) is burnt in oxygen. Find the volume of the resulting gases measured at STP.
9. The drain cleaner, Drainex contains small bits of Aluminium which react with caustic soda to produce dihydrogen. What volume of dihydrogen at 20˚C and 1 bar will be released when 0.15 g Aluminium reacts?
10. 5.6 litres of methane (CH4) gas are ignited in oxygen gas. Calculate the number of moles of CO2 formed.
11. Calculate the volume of air containing 21% oxygen by volume at STP, required in order to convert 294cm3 of sulphur dioxide to sulphur trioxide under the same conditions.
12. What volume of a solution of HCL containing 73 g/L would suffice for the exact neutralization of NaOH obtained by allowing 0.46 g of metallic sodium to react with water?
13. How much volume of Sulphur dioxide at NTP will be obtained by completely burning 10g of pure sulphur?
14. KClO3 on heating decomposes to KCl and O2. What is the volume of oxygen at STP liberated by thermal decomposition of 0.1 mole of KClO3?
15. Impure sample of calcium carbonate has 80% pure calcium carbonate. 25 g of this sample is treated with excess of HCL. Calculate the volume of CO2 evolved at NTP.
16. What mass of limestone 90% purity is needed to obtain 4.5 litre CO2 at NTP?
17. Zinc and hydrochloric acid react according to the reaction:

Zn (s) + 2 HCl (aq) → ZnCl2 (aq) + H2 (g)

If 0.3 mol Zn are added to hydrochloric acid containing 0.52 mol of HCl, how many moles of H2 are produced?

1. 3 g of H2 react with 29 g of O2 to form H2O.

a) Which is the limiting reactant?

b) Calculate the maximum amount of H2O that can be formed.

c) Calculate the amount of the reactant left unreacted.

SOME BASIC CONCEPT OF CHEMISTRY Page No. 6

1. In the reaction: H2 (g) + I2 (g) → 2 HI (g) ,

0.01 mole of I2 taken initially and only 20% of I2 is transformed into HI. Calculate the weight of HI formed. (I = 127 amu)

1. 6.5 gm of Zn metal is added to a solution containing 3.65 g/L HCl. Find out

a) Which is the limiting reagent. b) The volume of hydrogen liberated

1. 25.4 gm of iodine and 14.2 g of chlorine are made to react completely to yield a mixture of ICl and ICl3. Calculate the number of moles of ICl and ICl3 formed?
2. 30 g NaCl react with 60 g AgNO3 to give AgCl and NaNO3. Which is the limiting reagent?

**Answers**

1. 10.995 moles 2. 700 g 3. 36 g 4. 0.5 mole

5. 81.67 g 6. Cost of HCl = 5.70 Rs, Cost of H2SO4 = 1.91 Rs. 7. 30.27 g

8. 42 g 9. Ca(OH)2 = 2.766 g , CaCl2 = 4.15 g , NH3 = 1.271 g , H2O = 1.3458 g

10. Fe is cheapest, Zn is expensive 11. 47.04% 12. 3.7 kg 13. 39.10%

14. 70.67% 15. 3.6 g 16. CaCO3 = 54.35% , MgCO3 = 45.65%

17. NaCl = 14% , KCl = 86% 18. 2598.3 cm3 19. CaCO3 = 62.5% , MgCO3 = 37.5%

20. 2.96 L 21. 10.78 g 22. 86.1% 23. 46.26 g 24. 336 litres

25. 81.9% 26. 23.25 L 27. 203 mL 28. 0.25 mole 29. 700 cm3

30. 10 cm3 31. 7 litre 32. 3.36 L 33. 4.48 L CO2 34. 22.32 g

35. 0.26 mol 36. a) H2 b) 27 g c) 5 g 37. 0.512 g HI

38. (a) HCl (b) 1.12 L 39. 0.1 mol ICl , 0.1 mol ICl3 40. AgNO3

SOME BASIC CONCEPT OF CHEMISTRY Page No. 7

**Karan Arora** **M: 99968-68554**

**Assignment – IV**

1. Calculate the Molality of a solution containing 20.7 g of potassium carbonate dissolved in 500 mL of solution? (Assume density of the solution = 1g/mL)
2. Calculate the Molality of a solution of ethanol in water in which the mole fraction of ethanol is 0.040.
3. a) What will be the Normality of 7 g/L H2SO4?

b) What will be the Strength of N/8 KOH solution in g/L?

1. Calculate the Molarity of water if its density is 1000 Kg/m3 ?
2. A sample of NaNO3 weighing 0.38 g is placed in a 50 mL measuring flask. The flask is then filled with water upto the mark on the neck. What is the Molarity of the solution?
3. What is the Molarity of a barium chloride solution prepared by dissolving 3.5 g of BaCl2.2H2O in enough water to make 500mL of solution? (At. Mass : Ba = 137, Cl = 35.5)
4. Concentration of glucose in normal blood is 90 mg per 100 mL. What is the Molarity of the glucose in blood?
5. Hydrochloric acid is sold commercially as 12 M solution. How many moles and how many grams of HCl are in 300 mL of 12 M solution?
6. Calculate the Molarity of a 96% by mass H2SO4 solution, whose density is 1.78 g/cm3 ?
7. The sterile saline solution used to rinse contact lenses can be made by dissolving 400 mg of NaCl in sterile water and diluting to 100 mL . What is the Molarity of the solution?
8. a) What would be the Molality of the solution obtained by dissolving 20 g Na2CO3 in 1000 g water?

b) 7.5 g KCl is dissolved in 500 mL water. Find out Molarity of the solution.

1. 100 g of a solvent contains 1/10 moles of NaCl. Find out the Molality of the solution?
2. Equal moles of water and urea are taken in flask. What is Mass percentage of H2O in the solution?
3. What is the Mole fraction of H2O2 and H2O in 20% (w/w) aqueous hydrogen peroxide?
4. A solution contains 25% water, 25% ethanol and 50% acetic acid by mass. Calculate the Mole fraction of each component?
5. 100 g solution of urea in water has 40 g urea (molar mass = 60 g/mol). What is the Molality of urea solution? What is Mole fraction of urea in solution?
6. Calculate the Molality and Mole fraction of the solute in aqueous solution containing 3 g urea per 250 g of water?
7. A sugar syrup of weight 214.2 g contains 34.2 g sugar (C12H22O11). Calculate:

a) Molal concentration b) Mole fraction of sugar in the syrup.

1. Calculate : a) Molarity

b) Molality of sulphuric acid solution of specific gravity 1.198 containing 27% H2SO4 by weight.

1. 4.45 g sulphuric acid was added to 82.2 g water and the density of the solution was found to be 1.029 g/cc at 25˚C and 1 atm pressure. Calculate : a) the weight percent b) the mole fraction

c) the mole percent d) the molality e) the molarity f) the normality of sulphuric acid in solution under these conditions.

SOME BASIC CONCEPT OF CHEMISTRY Page No. 8

1. The density of a 3 M sodium thio sulphate solution is 12.3 g per mL . Calculate :

a) the percentage by weight of sodium thio sulphate (Na2S2O3).

b) the mole fraction of sodium thio sulphate

c) the molalities of Na+ and S2 ions.

1. A solution of oxalic acid, (COOH)2.2H2O is prepared by dissolving 0.63 g to the acid in 250 cm3 of the solution. Calculate : a) Molarity b) Normality of the solution.
2. Commercial available concentrated hydrochloric acid contains 38% HCl by mass.

a) What is the Molarity of this solution? This density is 1.19 gcm-3.

b) What volume of concentrated hydrochloric acid is required to make 1 L of 0.1 M HCl?

1. a) A sample of NaOH weighing 0.4 g is dissolved in water and the solution is made to 50 cm3 in volumetric flask. What is the Molarity of the resulting solution?

b) How many grams of NaOH should be dissolved to make 100 cm3 0f 0.15 M NaOH solution?

1. A solution is prepared by adding 2 g of a substance A to 18 g of water. Calculate the Mass percent of the solute?
2. How many moles and how many grams of sodium chloride (NaCl) are present in 250 cm3 of a 0.5 M NaCl solution?
3. Concentrated aqueous sulphuric acid is 98% H2SO4 by mass and has a density of 1.84 g/cc. What volume of the concentrated acid is required to make 5 L of 0.5 M H2SO4 solution?
4. In a reaction vessel, 0.184 g of NaOH is required to be added for completing the reaction. How many milliliters of 0.15 M NaOH solution be added for this requirement?
5. Calculate the Molarity of pure water?

**Answers**

1. 0.313 m 2. 2.315 m 3. a) 1/7 b) 7 g/L 4. 55.56 5. 0.09 M

6. 0.028 M 7. 0.005 M 8. 131.4 g HCl 9. 17.44 M 10. 0.068 M

11. a) 0.1887 b) 0.20 12. 1 13. 23.077% 14. 0.116 H2O2 , 0.883 H2O

15. Water = 0.5 , ethanol = 0.196 , Acetic acid = 0.3 16. 11.12 molal , 0.167

17. 0.2 m , 0.00359 18. a) 0.55 m b) 0.0099 19. 3.3 M , 3.77 m

20. a) 5.14 b) 0.0098 c) 0.98 d) 0.552 e) 0.539 f) 1.07

21. a) 38.53% b) 0.065 c) Na+ = 7.73 m , S2 = 3.865 m 22. a) 0.02 M b) 0.04 M

23. a) 12.38 M b) 8.1 cm3 24. a) 0.2 M b) 0.6 g 25. 10%

26. 0.125 mole , 7.312 g 27. 136 cm3 28. 30.7 cm3 29. 55.56 M

SOME BASIC CONCEPT OF CHEMISTRY Page No. 9

**Karan Arora** **M: 99968-68554**

**Assignment – V**

1. A sample of salt has the following percentage composition : Fe = 36.76, S = 21.11, O = 42.14

Calculate the empirical formula of the compound. (At. Mass : Fe = 56, S = 32, O = 16).

1. A salt containing water of crystallization gave the following percentage composition:

Mg = 9.76, S = 13.01, O = 26.01 and H2O = 51.22 . Calculate the simplest formula?

1. An organic substance has the following percentage composition:

C = 40.687% H = 5.085% and O = 54.228%

The vapour density of the compound is 59. Calculate the molecular formula of the compound?

1. A crystalline salt when heated becomes anhydrous and loses 51.2% of its weight. The anhydrous salt on analysis gave the following percentage composition: Mg = 20% S = 26.66% & O = 53.33%

Calculate the molecular formula of the anhydrous salt and the crystalline salt. Molecular mass of the anhydrous salt is 120.

1. A compound containing carbon, hydrogen, and oxygen gave the following analytic data:

C = 40% and H = 6.67%

Calculate the molecular formula of the compound , if its molecular mass is 180?

1. On analysis, a substance was found to have the following percentage composition:

K = 31.84% Cl = 28.98% and O = 39.18%

Calculate its molecular formula , if its molecular mass is 122.5?

1. 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 the molecular formula of the liquid if its vapour density is 43.3?

1. A chemical is found to have the following composition:

C= 19.57% Fe = 15.2% N = 22.83% and K = 42.39%

Calculate the empirical formula of the compound. What will be its molecular formula if the molecular mass of the compound is 368?

1. Butyric acid contains only C, H and O. A 4.24 mg sample of butyric acid is completely burned. It gives 8.45 mg of CO2 and 3.46 mg of H2O. The molecular mass of butyric acid was determined by experiment to be 88 amu. What is molecular formula?
2. A compound contains : H = 4.07% C = 24.27% and Cl = 71.65%

Its molar mass is 98.96 g. What are its empirical and molecular formula?

1. A crystalline salt on being rendered anhydrous loses 45.6% of its weight. The percentage composition of the anhydrous salt is: Al = 10.5% K = 15.1% S = 24.96% and O = 49.92%

Find the simplest formula of the anhydrous and crystalline salt.

SOME BASIC CONCEPT OF CHEMISTRY Page No. 10

1. A compound containing sodium, sulphur, hydrogen and oxygen gave the following results on analysis:

Na = 14.28% S = 9.92% and H = 6.20%

Calculate the molecular formula of the anhydrous compound. If all the atoms of hydrogen in the compound are present in combination with oxygen as water of crystallization, what is the structure of the crystalline salt? The molecular mass of the crystalline salt is 322.

**Answers**

1. FeSO4 2. MgSO4.7H2O 3. C4H6O4 4. MgSO4.7H2O 5. C6H12O6

6. KClO3 7. C3H5NO2 8. K4FeC6N6 9. C4H8O2 10. CH2Cl , C2H4Cl2

11. KAlS2O8.12H2O 12. Na2SO4.10H2O

SOME BASIC CONCEPT OF CHEMISTRY Page No. 11

**Karan Arora** **M: 99968-68554**

**Assignment – VI**

1. 500 cm3 of 0.25 M Na2SO4 solution added to an aqueous solution of 15 g of BaCl2 resulted in formation of a white precipitate of BaSO4 . How many moles and how many grams of BaSO4 are formed?
2. If 20 g of CaCO3 is treated with 20 g of HCl, How many grams of CO2 will be produced?

CaCO3 (s) + 2 HCl (aq) → CaCl2 (aq) + H2O (l) + CO2 (g)

1. 50 kg of N2 (g) and 10 kg of H2 (g) are mixed to produce NH3 (g). Calculate the NH3 (g) formed. Identify the limiting reagent in the production if NH3 in this situation.
2. One litre of oxygen at STP is made to react with three litres of carbon monoxide at STP. Calculate the mass of each substance found after the reaction. Which one is the limiting reagent?
3. Calculate the volume of hydrogen liberated at STP when 500 cm3 of 0.5 N sulphuric acid reacts with excess of Zinc.
4. 5 g of marble was added to 7.5 g dilute hydrochloric acid. After the reaction was over, it was found that 0.5 g of marble was left unused. Calculate the percentage strength of hydrochloric acid. What volume of CO2 measured at STP will be evolved in the above reaction?
5. Calculate the volume of 1 mol L-1 aqueous sodium hydroxide that is neutralized by 200 mL of 2 mol L-1 aqueous hydrochloric acid and mass of sodium chloride produced?
6. Bromine is prepared commercially by the reaction :

2 Br- (aq) + Cl2 (aq) → 2 Cl- (aq) + Br2 (aq),

Suppose we have 50 mL of 0.06 M solution of NaBr. What volume of 0.05 M solution of Cl2 needed to react completely with the Br- ?

**Answers**

1. 0.072 mole , 16.776 g 2. 8.8 g 3. H2 is limiting reagent , NH3 formed = 56 g

4. CO unused = 1.25 g , CO2 formed = 3.92 g 5. H2 formed = 2800 cm3

6. 43.8% , 1008 cm3 7. 400 mL , 23.4 g 8. 30 mL

SOME BASIC CONCEPT OF CHEMISTRY Page No. 12

**Karan Arora** **M: 99968-68554**

**N.C.E.R.T EXERCISE**

1. Calculate the molecular mass of :

a) H2O b) CO2 c) CH4 [Ans = a) 18 amu b) 44 amu c) 16 amu]

1. Calculate the Mass percent of different elements present in sodium sulphate (Na2SO4).

[Ans = Na = 32.39% , S = 22.54% , O = 45.07%]

1. Determine the empirical formula of an oxide of iron which has 69.9% iron and 30.1% oxygen by mass. (At . Mass : Fe = 55.85 amu , O = 16 amu ) [Ans = Fe2O3]
2. Calculate the amount of carbon dioxide that could be produce when :

a) 1 mole of carbon is burnt in air b) 1 mole of carbon is burnt in 16 g of dioxygen

c) 2 moles of carbon are burnt in 16 g of dioxygen [Ans = a) 44 g b) 22 g c) 22 g]

1. Calculate the mass of sodium acetate (CH3COONa) required to make 500 mL of a 0.375 molar aqueous solution. Molar mass of sodium acetate is 82.0245 g/mole. [Ans = 15.38 g ]
2. Calculate the concentration of nitric acid in moles per litre in a sample which has a density, 1.41 g/mL and mass percent of nitric acid in it being 69%. [Ans = 15.44 M]
3. How much copper can be obtained from 100 g of copper sulphate (CuSO4)? [Ans = 39.81 g]
4. Determine the molecular formula of an oxide of iron in which the mass percent of iron and oxygen are 69.9 and 30.1 respectively. Given that the molar mass of the oxide is 159.8 g/mol. [Ans = Fe2O3]
5. Calculate the atomic mass (average) of chlorine using the following data :

% Natural Abundance Molar mass

35Cl 75.77 34.9689

37Cl 24.23 36.9659 [Ans = 35.4527]

1. In three moles of ethane (C2H6), calculate :

a) Number of moles of carbon atoms b) Number of moles of hydrogen atoms

c) Number of molecules of ethane [Ans = a) 6 moles b) 18 moles c) 18 x 1023 molecules]

1. What is the concentration of sugar (C12H22O11) in mol L-1 if its 20 g are dissolved in enough water to make a final volume up to 2 L ? [Ans = 0.0293 M]
2. If the density of methanol is 0.793 kg L-1 , what is its volume needed for making 2.5 L of its 0.25 M solution? [Ans = 25.22 mL]
3. A sample of drinking water was found to be severely contaminated with chloroform, CHCl3, supposed to be carcinogen. The level of contamination was 15 ppm (by mass)

a) Express this in percent by mass. [Ans = 1.5 x 10-3 %]

b) Determine the molality of chloroform in the water sample. [Ans = 1.26 x 10-4 m]

1. If the speed of light is 3 x 108 m/s, calculate the distance covered by light in 2 ns. [Ans = 0.60 m]
2. In the reaction , A + B2 → AB2 , Identify the limiting reagent , if any, in the following mixtures:

a) 300 atoms of A + 200 molecules of B2 b) 2 mol A + 3 mol B2

c) 100 atoms of A + 100 molecules of B2 d) 5 mol A + 2.5 mol B2 e) 2.5 mol A + 5 mol B2

[Ans = a) B2 b) A c) no limiting d) B2 e) A ]

SOME BASIC CONCEPT OF CHEMISTRY Page No. 13

1. Dinitrogen and dihydrogen react with each other to produce ammonia according to the chemical equation : N2 (g) + 3 H2 (g) → 2 NH3 (g)

a) Calculate the mass of ammonia produced if 2 x 103 g dinitrogen react with 1 x 103 g dihydrogen .

b) Will any of the two reactant remain unreacted?

c) If yes , which one and what would be its mass ? [Ans = a) 2428.57 g b) H2 c) 571.4 g]

1. How are 0.5 mol Na2CO3 and 0.5 M Na2CO3 different?
2. If 10 volumes of dihydrogen gas reacts with 5 volumes of dioxygen gas, how many volumes of water vapours could be produced? [Ans = 10 volumes]
3. Which one of the following will have largest no of atoms?

a) 1 g Au b) 1 g Na c) 1g Li d) 1 g Cl2 (g)

(At. Mass: Au = 197, Na = 23, L i= 7, Cl = 25.5 amu) [Ans = 1 g of Li ]

1. Calculate the molarity of a solution of ethanol in water in which the mole fraction of ethanol is 0.040.

[Ans = 2.31 M]

1. What will be the mass of one 12C atom in g? [Ans = 1.9927 x 10-23 g]
2. Use the data given in the following table to calculate the molar mass of naturally occurring Argon

Isotope Isotopic molar mass Abundance

36Ar 35.96755 g mol-1 0.337

38Ar 37.96272 g mol-1 0.063

40Ar 39.9624 g mol-1 99.60 [Ans = 40 g mol-1]

1. Calculate the no of the atoms in each of the following:

a) 52 moles of He b) 52u of He c) 52 g of He [Ans = a) 3.13 x 1025 b) 13 c) 7.82 x 1024]

1. A welding fuel gas contains carbon and hydrogen only. Burning a small sample of it in oxygen gives 3.38 g carbon dioxide, 0.69 g of water and no other products. A volume of 10 L (measured at STP) of this welding gas is found to weight 11.6 g. Calculate : a) empirical formula b) molar mass of the gas

c) molecular formula [Ans = a) CH b) 26 g mol-1 c) C2H2]

1. Calcium carbonate reacts with aqueous HCL according to the reaction :

CaCO3 (s) + 2 HCL (aq) → CaCl2 (aq) + CO2 (g) + H2O (l)

What mass of CaCO3 is required to react completely with 25 mL of 0.75 M HCL? [Ans = 0.938 g]

1. Chlorine is prepared in the laboratory by treating manganese dioxide (MnO2) with aqueous hydrochloric acid according to the reaction :

4HCL (aq) + MnO2 (s) → 2 H2O (l) + MnCl2 (aq) + Cl2 (g)

How many grams of HCL react with 5 g of manganese dioxide? (at. Mass of Mn = 55u) [Ans = 8.4 g]

SOME BASIC CONCEPT OF CHEMISTRY Page No. 14

**Karan Arora** **M: 99968-68554**

**COMPETITION FOCUS**

1. Number of atoms of oxygen present in 10.6 gm of Na2CO3.

|  |  |  |  |
| --- | --- | --- | --- |
| a) 6.02 x 1022 | b) 12.04 x 1022 | c) 1.806 x 1023 | d) 6.35 x 1020 |

1. Which of the following has maximum mass?

|  |  |
| --- | --- |
| a) 0.1 gm atom of carbon | b) 0.1 mole NH3 |
| c) 6.022 x 1022 molecule of H2 | d) 1120 cm3 of CO2 |

1. Total number of electron present in 18 mL of H2O

|  |  |  |  |
| --- | --- | --- | --- |
| a) 6.02 x 1023 | b) 6.02 x 1022 | c) 6.02 x 1024 | d) 6.02 x 1025 |

1. A drug marizuana has its activity due to tetra hydro cannabinol, which has 70% as many carbon atoms as hydrogen atoms, 15 times as many hydrogen atoms as oxygen atom. The number of moles in a gram of tetra hydro cannabinol is 0.00318. What is its molecular formula.

|  |  |  |  |
| --- | --- | --- | --- |
| a) C16H34O2 | b) C12H32O3 | c) C21H30O2 | d) None |

1. Cortisone is a molecular substance which contains 21 carbon atom per molecule. If carbon atoms is 69.98% by weight. What is molecular weight of cortisone?

|  |  |  |  |
| --- | --- | --- | --- |
| a) 360.1 | b) 176.8 | c) 575.2 | d) 143.8 |

1. Number of gram molecule of oxygen in 6.02 x 1024 CO molecule is.

|  |  |  |  |
| --- | --- | --- | --- |
| a) 10 gm molecule | b) 5 gm molecule | c) 1 gm molecule | d) 0.5 gm molecules |

1. How many moles of e- weight 1 kg (wt. of e- = 9.1 x 10-31 kg).

|  |  |  |  |
| --- | --- | --- | --- |
| a) 6.022 x 1023 | b) 1031 | c) 1054 | d) 108 |

1. Which of the following will contain same number of atoms as in 20 g of Ca?

|  |  |  |  |
| --- | --- | --- | --- |
| a) 24 mg Mg | b) 12 gm C | c) 8 gm oxygen gas | d) 16 gm oxygen atom |

1. In a glass tube, there is 18 g of glucose, 0.08 mole of glucose is taken out, glucose left in glass tube is.

|  |  |  |  |
| --- | --- | --- | --- |
| a) 0.1 gm | b) 0.02 gm | c) 0.1 mole | d) 3.6 gm |

1. An unknown amino acid has 0.032% sulphur. It each molecule has one sulphur atom only, then 1 gm of amino acid will have molecules equal to.

|  |  |  |  |
| --- | --- | --- | --- |
| a) 6.02 x 1018 | b) 6.02 x 1019 | c) 6.02 x 1021 | d) 6.02 x 1023 |

1. A sample of (NH4)3PO4 contains 3.18 mole of hydrogen atoms. Then number of moles of oxygen atom in the sample is

|  |  |  |  |
| --- | --- | --- | --- |
| a) 0.265 | b) 0.795 | c) 1.06 | d) 3.18 |

1. What is total number of atoms in 25 mg in camphor (C10H16O).

|  |  |  |  |
| --- | --- | --- | --- |
| a) 9.89 x 1019 | b) 6.02 x 1020 | c) 9.89 x 1020 | d) 2.67 x 1021 |

1. If the atomic wt. of carbon is taken as 6 amu. The value of Avogadro constant will be

|  |  |  |  |
| --- | --- | --- | --- |
| a) 12.04 x 1023 mole – 1 | b) 3.01 x 1023 mole – 1 | c) 1.5 x 1023 mole – 1 | d) 6.02 x 1023 mole – 1 |

SOME BASIC CONCEPT OF CHEMISTRY Page No. 15

1. The atomic wt. of two elements A and B are 40 and 80 respectively. If ‘x’ gm of ‘A’ contains y atom then how many atom are present in 4x gm to ‘B’.

|  |  |  |  |
| --- | --- | --- | --- |
| a) y/2 | b) y/4 | c) y | d) 2y |

1. From 392 mg of H2SO4, 1.204 x 1021 molecules are removed. How many moles of H2SO4 are left?

|  |  |  |  |
| --- | --- | --- | --- |
| a) 2 x 10 – 3 | b) 1.2 x 10 – 3 | c) 4 x 10 – 3 | d) 1.5 x 10 – 3 |

1. Calculate number of water molecule in a drop of H2O. If 1 mL of H2O has 20 drops. (No is the Avogadro no.)

|  |  |  |  |
| --- | --- | --- | --- |
| a) 0.5 No /18 | b) 0.005 No | c) 0.5 No | d) 0.05 No /18 |

1. The number of moles of 6C12 in 1 amu is

|  |  |  |  |
| --- | --- | --- | --- |
| a) | b) No | c) (No)2 | d) |

1. One mole of P4 molecules contain:

|  |  |
| --- | --- |
| a) 1 molecule of P | b) 4 molecules of P |
| c) 6.022 x 1023 atoms of P | d) 24.088 x 1023 atoms of P |

1. The total number of protons, electrons and neutrons in 12 g of 6C12 is:

|  |  |  |  |
| --- | --- | --- | --- |
| a) 1.084 x 1025 | b) 6.022 x 1024 | c) 6.022 x 1023 | d) 18 |

1. The isotopic abundance of C – 12 and C – 14 is 98% and 2% respectively . What would be the number of

C – 14 isotope in 12 g carbon sample ?

|  |  |  |  |
| --- | --- | --- | --- |
| a) 1.032 x 1022 | b) 3.01 x 1023 | c) 5.88 x 1023 | d) 6.02 x 1023 |

1. The volume occupied by one molecule of water (density = 1 gcm-3) is

|  |  |  |  |
| --- | --- | --- | --- |
| a) 18 cm3 | b) 22400 cm3 | c) 6.023 x 10-23 cm3 | d) 3 x 10-23 cm3 |

1. Number of electrons in 1.8 mL of H2O is

|  |  |  |  |
| --- | --- | --- | --- |
| a) 6.02 x 1023 | b) 3.011 x 1023 | c) 0.602 x 1023 | d) 60.22 x 1023 |

1. The density of a liquid (mol. wt. = 70) is 1.2 g/mL. If 2 mL of liquid contains 35 drops, the number of molecules of liquid in one drop are:

|  |  |  |  |
| --- | --- | --- | --- |
| a) NA | b) NA | c) NA | d) 1.2 NA |

1. Loschmidt number is equal to:

|  |  |
| --- | --- |
| a) Molecules present in 1 mL of gas at STP | b) 2.69 x 1019 molecules of gas |
| c) 4.46 x 10-5 mole of gas | d) Either of the above |

1. 11.2 litre of a gas at STP weighs 14 gm. The gas could not be:

|  |  |  |  |
| --- | --- | --- | --- |
| a) N2 | b) CO | c) B2H6 | d) N2O |

1. 8 g of oxygen has same number of atoms in:

|  |  |  |  |
| --- | --- | --- | --- |
| a) 2 gm H2 | b) 8 gm O3 | c) 16 gm O3 | d) 4 gm H2 |

1. The haemoglobin from the red blood corpuscles of most mammals contains approximately 0.33% iron by weight. The molecular weight of haemoglobin as 67,200. The number of iron atoms in each molecule of haemoglobin is (At. wt. of iron = 56).

|  |  |  |  |
| --- | --- | --- | --- |
| a) 3 | b) 2 | c) 4 | d) 5 |

SOME BASIC CONCEPT OF CHEMISTRY Page No. 16

1. The maximum number of molecules is present in:

|  |  |
| --- | --- |
| a) 15 L of H2 gas at STP | b) 5 L of N2 gas at STP |
| c) 0.5 gm of H2 gas | d) 10 gm of O2 gas |

1. At STP the density of CCl4 vapour in g/L will be nearest to

|  |  |  |  |
| --- | --- | --- | --- |
| a) 8.67 | b) 6.87 | c) 5.67 | d) 4.26 |

1. If NA is Avogadro’s number then number of valence electrons in 4.2 gm of nitride ions (N3-) is:

|  |  |  |  |
| --- | --- | --- | --- |
| a) 3.2 NA | b) 1.6 NA | c) 2.4 NA | d) 1.2 NA |

1. The number of moles of oxygen in one litre of air containing 21% oxygen by volume, in standard conditions is:

|  |  |  |  |
| --- | --- | --- | --- |
| a) 0.176 mol | b) 0.32 mol | c) 0.0093 mol | d) 2.2 mol |

1. Number of atoms in 4.25 gm of NH3 is approximately.

|  |  |  |  |
| --- | --- | --- | --- |
| a) 6 x 1023 | b) 15 x 1023 | c) 1.5 x 1023 | d) 2.5 x 1023 |

1. A gaseous mixture contains O2 and N2 in the ratio 1 : 4 by weight. Then the ratio of their number of molecules in the mixture is:

|  |  |  |  |
| --- | --- | --- | --- |
| a) 3 : 32 | b) 7 : 32 | c) 1 : 4 | d) 3 : 16 |

1. 0.25 mol of P4 molecules contains \_\_\_\_\_\_\_\_\_\_ atoms.

|  |  |  |  |
| --- | --- | --- | --- |
| a) 1.76 x 1023 | b) 6.02 x 1019 | c) 6.023 x 1023 | d) 8.086 x 1023 |

1. How many water molecules are there in one drop of water (Volume = 0.0018 mL) at room temperature?

|  |  |  |  |
| --- | --- | --- | --- |
| a) 4.86 x 1017 | b) 6.023 x 1024 | c) 2.584 x 1019 | d) 6.023 x 1019 |

1. The total number of protons in 10 gm of calcium carbonate is

|  |  |  |  |
| --- | --- | --- | --- |
| a) 3.01 x 1024 | b) 4.06 x 1024 | c) 30.1 x 1024 | d) 3.01 x 1023 |

1. If 3.02 x 1019 molecules are removed from 98 mg of H2SO4, then number of moles of H2SO4 left are:

|  |  |  |  |
| --- | --- | --- | --- |
| a) 0.1 x 10 – 3 | b) 9.5 x 10 – 4 | c) 1.2 x 10 – 4 | d) 1.5 x 10 – 3 |

1. Specific volume of cylindrical virus particle is 6.02 x 10-2 cc/g. Whose radius and length are 7Å and 10Å respectively. Find molecular weight of virus.

|  |  |  |  |
| --- | --- | --- | --- |
| a) 15.4 kg/mol | b) 1.54 x 104 kg/mol | c) 4.68 x 104 kg/mol | d) 2.08 x 103 kg/mol |

1. 500 mL of NH3 contains 6 x 1023 molecules at STP. How many molecules are present in 100 mL of CO2 at STP?

|  |  |  |  |
| --- | --- | --- | --- |
| a) 6 x 1023 | b) 1.5 x 1023 | c) 1.2 x 1023 | d) none of these |

1. The number of gram molecules of oxygen in 6.02 x 1024 CO molecules is

|  |  |  |  |
| --- | --- | --- | --- |
| a) 10 gm molecules | b) 5 gm molecules | c) 1 gm molecules | d) 0.5 gm molecules |

1. Percentage of Se in peroxidase anhydrous enzyme is 0.5% by weight (At. wt. = 78.4) then minimum molecular weight of peroxidase anhydrous enzyme is

|  |  |  |  |
| --- | --- | --- | --- |
| a) 1.568 x 103 | b) 1.568 x 104 | c) 25.68 | d) 4.316 x 104 |

1. Number of atoms in 560 gm of Fe (At. wt. = 56) is

|  |  |
| --- | --- |
| a) is twice that of 70 gm N | b) is half that of 20 gm H |
| c) both are correct | d) none of correct |

1. How many moles of magnesium phosphate, Mg3(PO4)2 will contain 0.25 mole of oxygen atoms?

|  |  |  |  |
| --- | --- | --- | --- |
| a) 0.02 | b) 3.125 x 10-2 | c) 1.25 x 10-2 | d) 2.5 x 10-2 |
|  |  |  |  |

SOME BASIC CONCEPT OF CHEMISTRY Page No. 17

1. 224 mL of a triatomic gas weights 1 gm at 273 K and 1 atm. The mass of one atom of this gas is :

|  |  |  |  |
| --- | --- | --- | --- |
| a) 8.3 x 10-23 gm | b) 2.08 x 10-23 gm | c) 5.53 x 10-23 gm | d) 6.24 x 10-23 gm |

1. Number of gram atoms of an element in one atom is:

|  |  |  |  |
| --- | --- | --- | --- |
| a) 6.023 x 1023 | b) 1.66 x 10-24 | c) 2 x 1023 | d) none of theses |

1. The weight of one atom of an element is 6.644 x 10-23 gm. The gram atom element in 40 kg is

|  |  |  |  |
| --- | --- | --- | --- |
| a) 40 | b) 2 x 1023 | c) 103 | d) none of these |

1. The number of Cl- and Ca2+ ions in 222 gm of CaCl2 are:

|  |  |  |  |
| --- | --- | --- | --- |
| a) 4N , 2N | b) 2N , 4N | c) 1N , 2N | d) 2N , 1N |

1. Insulin contains 3.4% sulphur. The minimum molecular weight of insulin is :

|  |  |  |  |
| --- | --- | --- | --- |
| a) 941.176 | b) 944 | c) 945.27 | d) none of these |

1. Number of moles of 1 m3 gas at NTP is:

|  |  |  |  |
| --- | --- | --- | --- |
| a) 44.6 | b) 40.6 | c) 42.6 | d) 48.6 |

1. Density of air at NTP is 0.001293 g/mL. Its vapour density is :

|  |  |  |  |
| --- | --- | --- | --- |
| a) 0.001293 | b) 1.293 | c) 14.48 | d) can’t be calculated |

1. The weight of 1 mole of a gas of density 0.1784 g/L at NTP is :

|  |  |  |  |
| --- | --- | --- | --- |
| a) 0.1784 gm | b) 1 gm | c) 4 gm | d) can’t be calculated |

1. 22.4 litre of water vapour at NTP, when condensed to water, occupies an approximate volume of :

|  |  |  |  |
| --- | --- | --- | --- |
| a) 18 litre | b) 1 litre | c) 1 mL | d) 18 mL |

1. For the reaction : A + 2 B → C , 5 moles of A and 8 moles of B will produce:

|  |  |  |  |
| --- | --- | --- | --- |
| a) 5 moles of C | b) 4 moles of C | c) 8 moles of C | d) 13 moles of C |

1. 2 mol of H2S and 11.2 L SO2 at NTP react to form ‘X’ mol of sulphur. ‘X’ is :

SO2 + 2 H2S → 3 S + 2 H2O

|  |  |  |  |
| --- | --- | --- | --- |
| a) 1.5 | b) 3 | c) 11.2 | d) 6 |

1. Assuming fully decomposed the volume of CO2 released at NTP on heating 9.85 gm of BaCO3 .(At. wt. of Ba = 137) will be :

|  |  |  |  |
| --- | --- | --- | --- |
| a) 0.84 L | b) 2.24 L | c) 4.06 L | d) 1.12 L |

1. If 20 gm of CaCO3 is treated with 20 gm of HCl, how many grams of CO2 can be obtained according to the

reaction: CaCO3 (s) + 2 HCL (aq) → CaCl2 (aq) + CO2 (g) + H2O (l)

|  |  |  |  |
| --- | --- | --- | --- |
| a) 8.8 gm | b) 27.4 gm | c) 4.2 gm | d) 13.7 gm |

1. One mole of potassium chlorate is thermally decomposed and excess of aluminium is burnt in the gaseous product. How many moles of aluminium oxide are formed :

2 KClO3  2 KCl + 3 O2

3 O2 + 4 Al → 2 Al2O3

|  |  |  |  |
| --- | --- | --- | --- |
| a) 1 | b) 1.5 | c) 2 | d) 3 |

1. A certain metal sulphide, MS2 , is used extensively as a high temperature lubricant. If MS2 is 40.06% by mass sulphur, metal M has atomic mass :

|  |  |  |  |
| --- | --- | --- | --- |
| a) 160 amu | b) 64 amu | c) 40 amu | d) 96 amu |

SOME BASIC CONCEPT OF CHEMISTRY Page No. 18

1. 2.4 gm of pure Mg is dropped in 100 mL of 1 M HCl. Which of the following statement is wrong ?

|  |  |
| --- | --- |
| a) 1.12 L of hydrogen is produced at STP | b) 0.01 mol of magnesium is left behind |
| c) 0.1 mol of Mg ions are formed in solution | d) HCl is the limiting reagent |

1. If we take 2.2 gm CO2, 6.02 x 1021 atoms of nitrogen and 0.03 gm atoms of sulphur, then the molar ratio of C , N and S atoms will be?

|  |  |  |  |
| --- | --- | --- | --- |
| a) 1 : 2 : 5 | b) 5 : 1 : 2 | c) 2 : 5 : 3 | d) 5 : 1 : 3 |

1. The number of moles of KI required to produce 0.4 moles of K2[HgI4] by the reaction with HgCl2 is :

4 KI + HgCl2 → K2[HgI4] + 2 KCl

|  |  |  |  |
| --- | --- | --- | --- |
| a) 0.4 | b) 0.8 | c) 3.2 | d) 1.6 |

1. What weight of HNO3 is needed to convert 5 gm of iodine into iodic acid according to the reaction:

I2 + 10 HNO3 → 2 HIO3 + 10 NO2 + 4 H2O

|  |  |  |  |
| --- | --- | --- | --- |
| a) 12.4 gm | b) 24.8 gm | c) 0.248 gm | d) 49.6 gm |

1. An impure sample of table salt which weighed 6.5 gm gave on treatment with excess of silver nitrate, 14.35 gm of AgCl. What will be % purity of table salt :

|  |  |  |  |
| --- | --- | --- | --- |
| a) 80 % | b) 90 % | c) 50 % | d) 58 % |

1. For the reaction: 2 Fe(NO3)3 + 3 Na2CO3 → Fe2(CO3)3 + 6 NaNO3 . Initially if 2.5 mole of Fe(NO3)3 and 3.6 mole of Na2CO3 is taken. If 6.3 mole of NaNO3 is obtained then % yield of given reaction is:

|  |  |  |  |
| --- | --- | --- | --- |
| a) 50 % | b) 84 % | c) 87.5 % | d) 100% |

1. Myoglobin stores oxygen for metabolic process in muscles. Chemical analysis show that it contains 0.34% Fe by mass. What is the molar mass of myoglobin (There is one Fe atom per molecule):

|  |  |  |  |
| --- | --- | --- | --- |
| a) 16470.6 g/mol | b) 19467.5 g/mol | c) 82383.2 g/mol | d) 42934.6 g/mol |

1. Assuming that petrol is iso – octane (C8H18) and has a density of 0.8 g/mL, 1.425 litre of petrol on complete combustion will consume oxygen :

|  |  |  |  |
| --- | --- | --- | --- |
| a) 50 L | b) 125 L | c) 125 mol | d) 50 mol |

1. 10 gm of a piece of marble was put into excess of dilute HCl acid. When the reaction was complete, 1120 cm3 of CO2 was obtained at STP. The percentage of CaCO3 in the marble is:

|  |  |  |  |
| --- | --- | --- | --- |
| a) 10 % | b) 25 % | c) 50 % | d) 75 % |

1. 4.35 gm of a sample of pyrolusite (MnO2) when heated with conc. HCl gave chlorine. The chlorine when passed through potassium iodide solution liberated 6.35 gm of iodine. The percentage purity of the pyrolusite sample is : MnO2 + 4 HCl → MnCl2 + Cl2 + 2 H2O

KI + Cl2 → 2 KCl + I2

|  |  |  |  |
| --- | --- | --- | --- |
| a) 40 | b) 50 | c) 60 | d) 70 |

1. The mass of N2F4 produced by the reaction of 2 gm of NH3 and 8 gm of F2 is 3.56 gm. What is the percentage yield?

2 NH3 + 5 F2 → N2F4 + 6 HF

|  |  |  |  |
| --- | --- | --- | --- |
| a) 79 | b) 71.2 | c) 84.6 | d) 81.27% |

SOME BASIC CONCEPT OF CHEMISTRY Page No. 19

**Answers**

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 1. c | 2. d | 3. c | 4. c | 5. a | 6. b | 7. d | 8. c |
| 9. d | 10. a | 11. c | 12. d | 13. b | 14. d | 15. a | 16. d |
| 17. d | 18. d | 19. a | 20. a | 21. d | 22. a | 23. c | 24. d |
| 25. d | 26. b | 27. c | 28. a | 29. b | 30. c | 31. c | 32. a |
| 33. b | 34. c | 35. d | 36. a | 37. b | 38. a | 39. c | 40. b |
| 41. b | 42. c | 43. b | 44. c | 45. b | 46. c | 47. a | 48. a |
| 49. a | 50. c | 51. c | 52. d | 53. b | 54. a | 55. d | 56. a |
| 57. a | 58. d | 59. b , c | 60. d | 61. d | 62. a | 63. b | 64. c |
| 65. a | 66. c | 67. c | 68. b | 69 d |  |  |  |

SOME BASIC CONCEPT OF CHEMISTRY Page No. 20