	INDIAN SCHOOL AL WADI AL KABIR	
Class: XI	Department of Science 2021-22 Subject : Chemistry	Date of submission: 06.05.2021
Worksheet No: 01 with answers	Chapter: SOME BASIC CONCEPTS OF CHEMISTRY	Note: A4 FILE FORMAT
NAME OF THE STUDENT	CLASS & SEC:	ROLL NO.

Objective Type Questions

1. What will be the molarity of solution which contains 5.85 grams of sodium chloride in 500 ml of solution
   (a)4 mol/L (b) 20 mol/L (c) 0.2 mol/L (d) 2 mol/L

2. What will be the molality of solution containing 18.25 grams of HCl in 500ml of water
   (a) 0.1 m (b) 1 M (c) 1m (d) 0.5 m

3. What is the mass percentage of carbon in carbon dioxide?
   (a) 0.034 % (b) 27.27% (c) 3.4 % (d) 28.7 %

4. The empirical formula and Molar mass of a compound are CH_2O and 180 grams respectively What will be the molecular formula of the compound?

   (a) $C_9H_{18}O_9$ (b) CH_2O (c) $C_6H_{12}O_6$ (d) $C_2H_4O_2$

5. Which of the following is dependent on temperature?
   (a) Molarity
   (b) Molality
   (c)Mole fraction
   (d) Mass percentage

6. Which of the following compounds has the same empirical formula as that of glucose?
   a. CH_3CHO b. CH_3COOH
   c. CH_3OH d. C_2H_6

7. A binary compound contains 50% A (at. mass = 16) and 50% B (at. mass 32). The empirical formula of the compound is _____.

8. 10 mol of Zn reacts with 10 mol of HCl. Calculate the number of moles of H_2 produced
   (a) 5 mol (b) 10 mol(c) 20 mol (d) 2.5 mol

Questions 9- 10 are *Assertion Reason* type questions

a. If both *Assertion* and *Reason* are correct and *Reason* is the correct explanation of *Assertion*.
b. If both *Assertion* and *Reason* are correct but *Reason* is not the correct explanation of *Assertion*.
c. If *Assertion* is correct and *Reason* is wrong.
d. If *Assertion* is wrong and *Reason* is correct.

9. Assertion: Number of moles of H_2 in 0.224 L of hydrogen is 0.01 mole.
Reason: 22.4 L of H_2 at STP contains 6.023×10^{23}moles.

10. Assertion (A): The empirical mass of ethene is half of its molecular mass.
Reason I: The empirical formula represents the simplest whole number ratio of various atoms present in a compound.

2 Marks questions

11. Calculate the percentage of N in urea. (Molar mass of urea = 60 g mol^{-1}) Molecular formula of Urea is NH_2CONH_2

12. Prove that sum of all mole fractions of a solution is unity

13. Write empirical formula of following:
CO, Na_2CO_3, KCl, H_3PO_4, Fe_2O_3

14. An organic compound contains 144g of carbon and 12 g of hydrogen. If molar mass of this compound is 78 $gmol^{-1}$, calculate:
I. Empirical formula
II. Molecular formula

15. How many moles of ethane are required to produce 66 g CO_2 after combustion?

16. A solution is prepared by dissolving 150g of NaCl in 900 g of water. Calculate the mole fraction of each component.

17. How many moles of N_2 are required to produce 85g of NH_3? Calculate its mass.

3 Marks Questions

18. What do you mean by limiting reagent?
400 g of N_2 and 150 g of H_2 are mixed together to form NH_3. Identify the limiting reagent and calculate the amount of NH_3 produced.

19. Explain the following:

a. Mole fraction

b. Molarity

c. Molality

20. The density of the 2M solution of NaCl is 1.25 g ml^{-1}. Calculate molality of the solution.

21. Zinc and hydrochloric acid react according to the reaction:

$Zn(s) + 2HCl(aq) \rightarrow ZnCl_2(aq) + H_2(g)$

If 0.30 mol Zn are added to hydrochloric acid containing 0.52 mol of HCl, how many moles of H_2 are produced?

22. Caffeine has the following percent composition: carbon 49.48%, hydrogen 5.19%, oxygen 16.48% and nitrogen 28.85%. Its molecular weight is 194.19 g/mol. What is its molecular formula?

5 Marks Questions

23. Calcium carbonate reacts with aqueous HCl to produce $CaCl_2$ and CO_2. According to the reaction given below

$CaCO_3 + 2\ HCl \longrightarrow CaCl_2 + H_2O + CO_2$

What mass of calcium chloride will be formed when 0.19 mole of HCl reacts with 1000 grams of Calcium carbonate Name the limiting reagent.

24 Calculate the molality and molarity of 93 % H_2SO_4(mass/volume). The density of the solution is 1.84 gram per ml

Answers

1.	c
2.	c
3.	b
4.	c
5.	a
6.	b
7.	A_2B
8.	a
9.	c
10	a
11	46.6%
12	Mole fraction of A in solution $(x_A) = \frac{n_A}{n_A + n_B}$ Mole fraction of B in solution $(xa) = \frac{n_B}{n_A + n_B}$ So, $x_A + x_B = \frac{n_A + n_B}{n_A + n_B} = 1$
13	CO – CO Na_2CO_3 - Na_2CO_3 KCl – KCl H_3PO_4 - H_3PO_4 Fe_2O_3 - Fe_2O_3

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Element	Mass	Moles	Ratio	Simplest ratio
C	144	12	1	1
H	12	12	1	1

	Empirical formula = CH Empirical formula mass = 13 n = 78/13 = 6 Molecular formula = C_6H_6
15	$C_2H_6 + 7/2\ O_2 \rightarrow 2CO_2 + 3H_2O$ No: of moles of CO_2 = 66/44 = 1.5 moles C_2H_6 CO_2 As per eqn 1 mol 2 mol As per qn ? 1.5 mol Ans: 0.75 moles of ethane
16	n_{NaCl} = 150 / 58.5 = 2.56 n_{H2O} = 900 / 18 = 50 χ_{NaCl} = 2.56 / 2.56 + 50 = 0.0487 χ_{H2O} = 50 / 52.56 = 0.951
17	$N_2 + 3H_2 \rightarrow 2NH_3$ No: of moles of NH_3 = 85/17 = 5 moles N_2 NH_3 As per eqn, 1 mol 2 mol As per qn, ? 5 moles Therefore no: of moles of N_2 = 2.5 moles
18	. Limiting reagent: The reactant, which gets consumed first, limits the amount of product formed and is, therefore, called the limiting reagent. $N_2 + 3H_2 \rightarrow 2NH_3$ No: of moles of N_2 = 400/ 28 = 14.28 mol No: of moles of H_2 = 150 / 2 = 75 mol N_2 H_2 As per eqn. 1 3 As per qn, 14.28 ? No: of moles of H_2 required for 14.28 moles of N_2 = 42.84 mol Therefore, H_2 is excess reagent i.e. N_2 is limiting reagent. N_2 NH_3 As per eqn. 1 2 As per qn, 14.28 ? Therefore no: of moles of NH_3 = 28.56 mol Mass of NH_3 = 28.56 × 17 = 485.52 g

19	. a. Mole fraction: It is the ratio of number of moles of a particular component to the total number of moles of the solution. $\text{Mole fraction of A} = \frac{\text{No. of moles of A}}{\text{No. of moles of solutions}} = \frac{n_A}{n_A + n_B}$ $\text{Mole fraction of B} = \frac{\text{No. of moles of B}}{\text{No. of moles of solutions}} = \frac{n_B}{n_A + n_B}$ b. Molarity: It is defined as the number of moles of the solute in 1 litre of the solution. $\text{Molarity (M)} = \frac{\text{No. of moles of solute}}{\text{Volume of solution in litres}}$ c. Molality: It is defined as the number of moles of solute present in 1 kg of solvent. $\text{Molality (m)} = \frac{\text{No. of moles of solute}}{\text{Mass of solvent in kg}}$
20	. Molarity = 2M Assume volume of solution = 1 L Therefore, No of moles of NaCl = 2 mol Mass of NaCl = 2 × 58.5 = 117 g Mass of 1 L of solution = 1.25 gml^{-1}× 1000g = 1250 g. (Since density = 1.25 gml^{-1} and density = mass / volume) Mass of water = 1250 g -117 g = 1133 g Molality = No: of moles of solute/ Mass of solvent(kg) = 2/1.133 = 1.765 $molkg^{-1}$
21	HCl is limiting reagent; H_2 formed = 0.36 mol
22	Moles of C = 49.48/12 = 4.12 mol Moles of H = 5.19/1 = 5.19 mol Moles of O = 16.48/16 = 1.03 mol Moles of N = 28.85/14 = 2.06 mol Empirical formula = $C_4H_5N_2O$ Molecular formula = $C_8H_{10}N_4O_2$
23	HCl is the limiting reagent 10.54 grams of calcium chloride is formed
24	Molarity = 9.49 M, molality = 10.43 m

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