DPP No: 04

SYLLABUS : Mole Concept

1. 500 mL of a glucose solution contains 6.02×10^{22} molecules. The concentration of the solution is

(A) 0.1 M (B) 1.0 M (C) 0.2 M (D) 2.0 M

2. 1000 gram aqueous solution of $CaCO_3$ contains 10 gram of carbonate. Concentration of solution is

(A) 10ppm (B) 100ppm (C) 1000ppm (D) 10,000 ppm

3. Equal moles of H_2O and NaCl are present in a solution. Hence, molality of NaCl solution is :

(A) 0.55 (B) 55.5 (C) 1.00 (D) 0.18

4. Decreasing order of mass of pure NaOH in each of the aqueous solution.

(I) 50 g of 40% (W/W) NaOH

(II) 50 ml of 50% (W/V) NaOH (d_{sol} = 1.2 g/ml).

(III) 50 g of 15 M NaOH (d_{sol} = 1 g/ml).

(A) I, II, III (B) III, II, I (C) II, III, I (D) III = II = I.

5. Mole fraction of A in H_2O is 0.2. The molality of A in H_2O is :

(A) 13.9 (B) 15.5 (C) 14.5 (D) 16.8

6. What is the molarity of H_2SO_4 solution that has a density of 1.84 g/cc and contains 98% by mass of H_2SO_4? (Given atomic mass of S = 32)

(A) 4.18 M (B) 8.14 M (C) 18.4 M (D) 18 M

7. The molarity of the solution containing 2.8%(mass / volume) solution of KOH is : (Given atomic mass of K = 39) is :

(A) 0.1 M (B) 0.5 M (C) 0.2 M (D) 1 M

8. A solution of $FeCl_3$ is $\frac{M}{30}$ its molarity for Cl^- ion will be :

(A) $\frac{M}{90}$ (B) $\frac{M}{30}$ (C) $\frac{M}{10}$ (D) $\frac{M}{5}$

9. If 500 ml of 1 M solution of glucose is mixed with 500 ml of 1 M solution of glucose final molarity of solution will be :

(A) 1 M (B) 0.5 M (C) 2 M (D) 1.5 M

10. The volume of water that must be added to a mixture of 250 ml of 0.6 M HCl and 750 ml of 0.2 M HCl to obtain 0.25 M solution of HCl is :

(A) 750 ml (B) 100 ml (C) 200 mℓ (D) 300 mℓ

11. What volume of a 0.8 M solution contains 100 milli moles of the solute?

(A) 100 mL (B) 125 mL (C) 500 mL (D) 62.5 mL

12. The molarity of Cl^- in an aqueous solution which was (w/V) 2% NaCl, 4% $CaCl_2$ and 6% NH_4Cl will be

(A) 0.342 (B) 0.721 (C) 1.12 (D) 2.18

13. 2M of 100 ml Na_2SO_4 is mixed with 3M of 100 ml NaCl solution and 1M of 200 ml $CaCl_2$ solution. Then the ratio of the concentration of cation and anion.

(A) 1/2 (B) 2 (C) 1.5 (D) 1

14. What volume (in ml) of 0.2 M H_2SO_4 solution should be mixed with the 40 ml of 0.1 M NaOH solution such that the resulting solution has the concentration of H_2SO_4 as $\frac{6}{55}$ M.

(A) 70 (B) 45 (C) 30 (D) 58

15. What weight of $CaCO_3$ must be decomposed to produce the sufficient quantity of carbon dioxide to convert 21.2 kg of Na_2CO_3 completely in to $NaHCO_3$. [Atomic mass Na = 23, Ca = 40]

$$CaCO_3 \longrightarrow CaO + CO_2$$

$$Na_2CO_3 + CO_2 + H_2O \longrightarrow 2NaHCO_3$$

(A) 100 Kg (B) 20 Kg (C) 120 Kg (D) 30 Kg

16. NX is produced by the following step of reactions

$$M + X_2 \longrightarrow MX_2$$

$$3MX_2 + X_2 \longrightarrow M_3X_8$$

$$M_3X_8 + N_2CO_3 \longrightarrow NX + CO_2 + M_3O_4$$

How much M (metal) is consumed to produce 206 g of NX. (Take at wt of M = 56, N=23, X = 80)

(A) 42 g (B) 56 g (C) $\frac{14}{3}$ g (D) $\frac{7}{4}$ g

17. The following process has been used to obtain iodine from oil-field brines in California.

$$NaI + AgNO_3 \longrightarrow AgI + NaNO_3 \; ; \quad 2AgI + Fe \longrightarrow FeI_2 + 2Ag$$

$$2FeI_2 + 3Cl_2 \longrightarrow 2FeCl_3 + 2I_2$$

How many kg of $AgNO_3$ are required in the first step for every 254 kg I_2 produced in the third step.

(A) 340 kg (B) 85 kg (C) 68 kg (D) 380 kg

18. The oxidation number of Phosphorus in $Mg_2P_2O_7$ is :

(A) + 3 (B) + 2 (C) + 5 (D) – 3

19. In the reaction $4A + 2B + 3C \rightarrow A_4B_2C_3$, what will be the number of moles of product formed, starting from one mole of A, 0.6 mole of B and 0.72 mole of C ?

(A) 0.25 (B) 0.3 (C) 0.24 (D) 2.32

20. Find the Cl^- concentration in solution which is obtained by mixing one mole each of $BaCl_2$, NaCl and HCl in 500 ml water.

21. The pressure of a gas having 2 mole in 44.8 litre vessel at 546 K is :

(A) 1 atm (B) 2 atm (C) 3 atm (D) 4 atm

22. How many grams of silicon is present in 35 gram atoms of silicon ?

23. The density of liquid mercury is 13.6 g/cm^3. How many moles of mercury are there in 1 litre of the metal?

24. Average atomic mass of Magnesium is 24.31 amu. This magnesium is composed of 79 mole % of ^{24}Mg and remaining 21 mole % of ^{25}Mg and ^{26}Mg. Calculate mole % of ^{26}Mg.

25. Calculate the weight of 6.022×10^{23} formula units of $CaCO_3$.

ANSWER KEY

1.	**(C)**	**2.**	(D)	**3.**	**(B)**	**4.**	**(B)**	**5.**	**(A)**	**6.**	**(C)**	**7.**	**(B)**
8.	**(C)**	**9.**	**(A)**	**10.**	**(C)**	**11.**	**(B)**	**12.**	**(D)**	**13.**	**(D)**	**14.**	**(A)**
15.	**(B)**	**16.**	**(A)**	**17.**	**(A)**	**18.**	**(C)**	**19.**	**(C)**	**20.**	8 M.	**21.**	**(B)**
22.	**980 g of Si**	**23.**	**68 mole**			**24.**	**10**	**25.**	**100 g.**				