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| **Karan Arora**  **R.L. Institute M: 9416974837**  **Class : XII**  **“SOLUTION”** |

**Level – I**

**(Based on Concentration Terms)**

1. If 0.4 g of NaOH is present in 40 mL of solution. What is the molarity and normality of solution.
2. The normality of 1.5 M H3PO4 is :
3. Find out the mass of H2SO4 in 150 mL, N/7 H2SO4.
4. One litre of N/2 HCl solution is heated in a beaker. It was observed that when the volume of the solution was reduced to 600 mL, 3.25 g of HCl is lost. Calculate the normality of the new solution.
5. Find out the Molarity of 93 % (w/w) H2SO4 . (Density = 1.84 g/mL).
6. A 100 cc solution is prepared by dissolving 2 g of NaOH in water. Calculate the normality of the solution.
7. If 20 cc of 1 M CaCl2 and 60 cc of 0.2 M CaCl2 are mixed, what will be the molarity of the final solution?
8. Find the percentage by mass and mass fraction of aspirin in the solution prepared by dissolving 3.65 g of aspirin in 25.08 g of water.
9. A solution was prepared by adding 125 cc of isopropyl alcohol to water until the volume of the solution was 175 cc. Find the volume fraction and volume percent of isopropyl alcohol in the solution.
10. Calculate the molality of ethanol solution in which the mole fraction of water is 0.88.
11. Dissolving 120 g of urea (molar mass = 60) in 1000 g of water gave a solution of density 1.15 g/mL. The molarity of the solution is \_\_\_\_\_\_\_\_.
12. The Molarity of the solution prepared by dissolving 6.3 g of oxalic acid (H2C2O4.2H2O) in 250 mL of water in mol/L is ‘x’ X 10 – 2. The value of x is \_\_\_\_\_\_\_.
13. What is the molarity and molality of a 13 % solution (by weight) of sulphuric acid with a density of 1.02 g/mL? To what volume should 100 mL of this acid be diluted in order to prepare a 1.5 N solution?
14. A bottle of commercial sulphuric acid (density = 1.787 g/mL) is labelled as 86 % by weight. What is the Molarity of the acid? What volume of the acid has to be used to make 1 L of 0.2 M H2SO4?

**Answers**

1. 0.25 M, 0.25 N 2. 4.5 N 3. 1.05 g 4. 0.685 N 5. 17.46 M 6. N/2

7. 0.40 M 8. (i) 12.7 % (ii) 0.127 9. (i) 0.7142 (ii) 71.4 % 10. 7.57 m

11. 2.05 M 12. 20 13. (i) 1.35 M (ii) 1.52 m (iii) 180 mL

14. 15.68 M , 12.75 mL

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**Karan Arora M: 9416974837**

**Multiple Choice Questions**

1. What is the normality of 2 M H3PO2 solution?

|  |  |  |  |
| --- | --- | --- | --- |
| a) 0.5 N | b) 1 N | c) 2 N | d) 3 N |

1. 23 g ethanol is dissolved in 36 g of water? Find mole fraction of ethanol?

|  |  |  |  |
| --- | --- | --- | --- |
| a) 2 | b) 0.5 | c) 0.2 | d) 0.8 |

1. How many gram of HNO3 is required to prepare 400 mL solution of 0.2 M HNO3?

|  |  |  |  |
| --- | --- | --- | --- |
| a) 5.04 g | b) 5040 g | c) 25.2 g | d) 2.52 g |

1. What is the mole fraction of benzene in solution containing 30 % by mass in carbon tetrachloride?

|  |  |  |  |
| --- | --- | --- | --- |
| a) 0.541 | b) 0.459 | c) 0.514 | d) 0.489 |

1. Calculate the amount of benzoic acid required to prepare 250 mL of 0.15 M solution in methanol.

|  |  |  |  |
| --- | --- | --- | --- |
| a) 4.575 g | b) 5.475 g | c) 4.015 g | d) 5.015 g |

1. Calculate the normality of 2.1 % (w/v) H2SO4 solution?

|  |  |  |  |
| --- | --- | --- | --- |
| a) 2.14 N | b) 4.28 N | c) 0.428 N | d) 0.214 N |

1. What is the Molarity of 1 N H2SO4 solution?

|  |  |  |  |
| --- | --- | --- | --- |
| a) 1 M | b) 2 M | c) 0.5 M | d) 3 M |

1. 20.6 g NaBr is dissolved in 500 mL solution what is the molarity of resulting solution?

|  |  |  |  |
| --- | --- | --- | --- |
| a)0.6 | b) 0.4 | c) 1 | d) None |

1. Calculate molality of the solution obtained by dissolving 11.7 g NaCl in 500 g water.

|  |  |  |  |
| --- | --- | --- | --- |
| a) 0.1 m | b) 0.3 m | c) 0.2 m | d) 0.4 m |

1. An antifreeze solution is prepared from 222.6 g of ethylene glycol and 200 g of water. What is the molality of the solution?

|  |  |  |  |
| --- | --- | --- | --- |
| a) 15.97 m | b) 19.57 m | c) 17.07 m | d) 17.95 m |

1. Density of 2.03 M aqueous solution of acetic acid is 1.017 g/mL. Molecular mass of Acetic acid is 60. Calculate the molality of the solution?

|  |  |  |  |
| --- | --- | --- | --- |
| a) 2.27 | b) 1.27 | c) 3.27 | d) 4.27 |

1. A molar solution is one that contains one mole of solute in :

|  |  |
| --- | --- |
| a) 1000 g of the solvent | b) one litre of the solution |
| c) 1000 g of the solution | d) 22.4 liters of the solution |

1. The Molarity of 900 g of water is :

|  |  |  |  |
| --- | --- | --- | --- |
| a) 50 M | b) 55.5 M | c) 5 M | d) cannot be calculated |

1. Calculate the mole percentage of CH3OH and H2O respectively in 60 % aqueous solution of CH3OH.

|  |  |  |  |
| --- | --- | --- | --- |
| a) 45.8 , 54.2 | b) 54.2 , 45.8 | c) 50 , 50 | d) 60 , 40 |

**Answers**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 1. c | 2. c | 3. a | 4. b | 5. a | 6. c | 7. c |
| 8. b | 9. d | 10. d | 11. a | 12. b | 13. b | 14. a |

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**Fill in the Blanks**

1. Molality is preferred over molarity due to ………….. independence.
2. On dilution the molarity of the solution is ……………… than initial concentration.
3. Molarity of the solution formed by mixture 0.4 g of NaOH in 100 mL water will be ………………. .
4. 25 % w/w indicates ……….. g of the solute in 1000 g of solution.
5. 1 litre of 0.1 M solution of H­2SO4 contains …………. g of H2SO4.

**Answers**

1. Temperature 2. Lower 3. 0.1 mol/Lt 4. 250 g 5. 9.8 g

**True – False**

1. Number of moles of the solute dissolved in 1000 g of solvent is called Molality of the solution.
2. The sum of the mole fractions of all the components in a ternary solution is unity.
3. 200 ml of water is added to 500 mL of 0.2 M solution, the molarity of the diluted solution is 1.428 M.
4. Molality of 1 M aqueous solution is less than 1 m.

**Answers**

1. True 2. True 3. False 4. False

**Matching Type Questions**

1. Column I Column II

|  |  |
| --- | --- |
| (i) Molarity | (a) g eq./L |
| (ii) Molality | (b) Moles /L |
|  | (c) Unit less |
|  | (d) Moles/Kg (solvent) |

1. Column I Column II

|  |  |
| --- | --- |
| (i) 49 g of H2SO4 in 1000 mL solution | (a) 0.25 M |
| (ii) 9.8 % (w/v) H3PO4 solution | (b) 1 M |
|  | (c) 0.5 M |
|  | (d) 0.82 M |

**Answers**

1. (i) – b ; (ii) – d 2. (i) – c ; (ii) – b

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**Level – 2**

**(Based on Concentration Terms)**

1. 8 g NaOH is dissolved in one litre of solution. Its molarity is :

|  |  |  |  |
| --- | --- | --- | --- |
| a) 0. 8 M | b) 0.4 M | c) 0.2 M | d) 0.1 M |

1. If 18 g of glucose is present in 1000 g of solvent, the solution is said to be :

|  |  |  |  |
| --- | --- | --- | --- |
| a) 1 molar | b) 0.1 molar | c) 0.5 molar | d) 0.1 molal |

1. The molarity of a solution of sodium chloride (mol. wt. = 58.5) in water containing 5.85 g of sodium chloride in 500 mL of solution is :

|  |  |  |  |
| --- | --- | --- | --- |
| a) 0.25 | b) 2 | c) 1 | d) 0.2 |

1. For preparing 0.1 M solution of H2SO4 in one litre, we need H2SO4 :

|  |  |  |  |
| --- | --- | --- | --- |
| a) 0.98 g | b) 4.9 g | c) 49 g | d) 9.8 g |

1. Mole fraction of glycerine (C3H5(OH)3) in a solution of 36 g of water and 46 g of glycerine is :

|  |  |  |  |
| --- | --- | --- | --- |
| a) 0.46 | b) 0.36 | c) 0.2 | d) 0.4 |

1. 1000 g aqueous solution of CaCO3 contains 10 g of calcium carbonate, concentration of the solution is :

|  |  |  |  |
| --- | --- | --- | --- |
| a) 10 ppm | b) 100 ppm | c) 1000 ppm | d) 10,000 ppm |

1. What is the normality of 1 M H3PO4 solution?

|  |  |  |  |
| --- | --- | --- | --- |
| a) 0.5 N | b) 1 N | c) 2 N | d) 3 N |

1. The molarity of 0.2 N Na2CO3 solution will be :

|  |  |  |  |
| --- | --- | --- | --- |
| a) 0.05 M | b) 0.2 M | c) 0.1 M | d) 0.4 M |

1. Normality of 0.3 M phosphorus acid is :

|  |  |  |  |
| --- | --- | --- | --- |
| a) 0.15 | b) 0.6 | c) 0.9 | d) 0.1 |

1. The molarity of pure water is :

|  |  |  |  |
| --- | --- | --- | --- |
| a) 100 M | b) 55.5 M | c) 50 M | d) 18 M |

1. Molarity of 720 g of pure water :

|  |  |  |  |
| --- | --- | --- | --- |
| a) 40 M | b) 4 M | c) 55.5 M | d) can’t be determined |

1. Equal weight of NaCl and KCl are dissolved separately in equal volumes of solutions then molarity of the two solutions will be :

|  |  |
| --- | --- |
| a) equal | b) That of NaCl will be less than that of KCl |
| c) That of NaCl will be more than that of KCl | d) That of NaCl will be half of that of KCl solution |

1. The mole fraction of oxygen in a mixture of 7 g of nitrogen and 8 g of oxygen is :

|  |  |  |  |
| --- | --- | --- | --- |
| a) 8/15 | b) 0.5 | c) 0.25 | d) 1 |

1. In a solution of 7.8 g benzene (C6H6) and 46 g toluene (C6H5CH3), the mole fraction of benzene is :

|  |  |  |  |
| --- | --- | --- | --- |
| a) 1/6 | b) 1/5 | c) 1/2 | d) 1/3 |

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1. An ‘X’ molal solution of a compound in benzene has mole fraction of solute equal to 0.2. The value of X is:

|  |  |  |  |
| --- | --- | --- | --- |
| a) 14 | b) 3.2 | c) 1.4 | d) 2 |

1. A 500 g tooth paste sample has 0.02 g fluoride concentration. What is the concentration of fluorine in terms of ppm level :

|  |  |  |  |
| --- | --- | --- | --- |
| a) 250 | b) 40 | c) 400 | d) 1000 |

1. The normality of 10 mL of 20 V H2O2 solution is :

|  |  |  |  |
| --- | --- | --- | --- |
| a) 1.79 | b) 3.58 | c) 60.86 | d) 6.086 |

1. H2O2 solution used for hair bleaching is sold as a solution of approximately 5 g H2O2 per 100 mL of the solution. The molecular mass of H2O2 is 34. The molarity of this solution is approximately :

|  |  |  |  |
| --- | --- | --- | --- |
| a) 0.15 M | b) 1.5 M | c) 3 M | d) 3.4 M |

1. Normality of 10 % (w/v) H2SO4 solution is nearly :

|  |  |  |  |
| --- | --- | --- | --- |
| a) 0.1 | b) 0.2 | c) 0.5 | d) 2 |

1. What volume of 0.1 N HNO3 solution can be prepared from 6.3 g of HNO3?

|  |  |  |  |
| --- | --- | --- | --- |
| a) 1 L | b) 2 L | c) 0.5 L | d) 5 L |

1. A molal solution is one that contains one mole of a solute in :

|  |  |
| --- | --- |
| a) 1000 g of the solvent | b) One litre of the solution |
| c) One litre of the solvent | d) 22.4 litre of the solution |

1. Which of the following statement is true :
2. Molarity is the number of moles of solute dissolved per litre of solvent.
3. The molarity and normality of a solution of sodium carbonate are same.
4. Molality of a solution is defined as the number of moles of solute dissolved in 1000 g of solution.
5. The ratio of mole fraction of solute and solvent is in the ratio of their respective moles.

|  |  |  |  |
| --- | --- | --- | --- |
| a) A & C | b) A & D | c) B & C | d) only D |

1. Two bottles of A and B contains 1 M and 1 m aqueous solution (d = 1 g/mL) of sulphuric acid respectively

|  |  |
| --- | --- |
| a) A is more concentrated than B | b) B is more concentrated than A |
| c) Concentration of A = Concentration of B | d) It is not possible to compare the concentration |

1. The molarity of 98 % (w/w) H2SO4 (d = 1.8 g/mL) is :

|  |  |  |  |
| --- | --- | --- | --- |
| a) 6 M | b) 18 M | c) 10 M | d) 4 M |

**Answers**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 1. c | 1. d | 1. d | 1. d | 1. c | 1. d | 1. d |
| 1. c | 1. b | 1. b | 1. c | 1. c | 1. b | 1. a |
| 1. b | 1. b | 1. b | 1. b | 1. d | 1. a | 1. a |
| 1. d | 1. a | 1. b |  |  |  |  |

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