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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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**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 – I**

**(Based on Henry’s Law)**

1. Maximum amount of solid solute that can be dissolved in specific amount of given liquid solvent does not depend upon :

|  |  |  |  |
| --- | --- | --- | --- |
| a) Temperature | b) Nature of solute | c) Pressure | d) Nature of solvent |

1. Low concentrations of oxygen in tissues of people living at high altitudes is due to :

|  |  |
| --- | --- |
| a) Low temperature | b) Low atmospheric pressure |
| c) High atmospheric pressure | d) Both (a) and (c) |

1. The value’s of Henry’s constant KH is :

|  |  |
| --- | --- |
| a) Greater for gases with higher solubility | b) Greater for gases with lower solubility |
| c) constant for all gases | d) Not related to the solubility of gases |

1. The concentration of solution with its vapour pressure is related in terms of :

|  |  |  |  |
| --- | --- | --- | --- |
| a) Mole fraction | b) Parts per million | c) Mass percentage | d) Molality |

1. Henry’s law constant for dissolution of CH4­ in benzene at 298 K is 2 x 105 mm of Hg. Then solubility of CH4­ in benzene at 298 K (in terms of mole fraction) under 760 mm of Hg is :

|  |  |  |  |
| --- | --- | --- | --- |
| a) 1.2 x 10 – 5 | b) 3.8 x 10 – 3 | c) 4 x 10 – 7 | d) 1 x 10 – 2 |

1. Which of the following gas does not obey Henry’s law?

|  |  |  |  |
| --- | --- | --- | --- |
| a) NH3 | b) H2 | c) O2 | d) He |

**Answers**

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

**Fill in the Blanks**

1. Ionic solids are generally soluble in \_\_\_\_\_\_\_\_ solvents.
2. The solubility of a solute decreases with increase of temperature if dissolution is \_\_\_\_\_\_\_\_\_\_\_\_.
3. Aquatic species are more comfortable in cold water due to \_\_\_\_\_\_\_ solubility of oxygen.
4. With increase of temperature, KH for gases increases whereas solubility \_\_\_\_\_\_\_\_.

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1. Sea divers for breathing inside sea use a mixture of O2 and the inert gas \_\_\_\_\_\_.
2. At altitudes, concentration of oxygen in the blood is low. People feel weak and unable to think. This disease is called \_\_\_\_\_\_\_\_\_\_.

**Answers**

1. Polar 2. Exothermic 3. High 4. Decreases 5. He 6. Anoxia

**True – False**

1. Aquatic species are less comfortable in cold water in compared to warm water.
2. To increase the solubility in CO2 in soft drinks and soda water, the bottle is sealed under low pressure and high temperature.
3. The value of Henry’s constant (KH) is constant for all gases.
4. For a gas dissolved in water, Henry’s constant (KH) increases with increase in temperature.

**Answers**

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

**Matching Type Questions**

1. Column I Column II

|  |  |
| --- | --- |
| (i) High KH for a particular gas indicates | (a) High temperature, High solubility |
| (ii) Low KH for a particular gas indicates | (b) Low temperature, High solubility |
|  | (c) High temperature, Low solubility |
|  | (d) low temperature, Low solubility |

1. Column I Column II

|  |  |
| --- | --- |
| (i) Gaseous solution | (a) Oxygen dissolved in water |
| (ii) Solid solution | (b) Glucose dissolved in water |
|  | (c) Camphor in nitrogen gas |
|  | (d) Copper dissolved in gold |

**Answers**

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

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