  
 **Mustansiriyah University – Collage of Science**

**Department of Chemistry – First Grade – First Term (2018 – 2019)**

**Subject: - Analytical Chemistry Examiner: - Dr: KHITAM JABER NABHAN**

**Q1 – Define Five of the following terms: -**

1. **Saturated Solution, 2- (%, 3- Density, 4- Quantitative Analysis,**

**5-Molality, 6- Mole Fraction (X).**

**Q2 – Answer the questions:-**

1. **Calculate the volume of a 0.232 N solution contains (a.) 3.17 milliequvalent of solute (b.) 6.5 equivalent of solute?**
2. **A solution contains (10 gm) Iodic Acid and (125 gm) Water, Calculate the concentration of solution expressed as: -**

**(a-) Mole fraction (X) of Iodic Acid. (b-) Molality.**

**Q3 – Answer the questions:-**

**a. How many (cm3) of concentrated sulfuric acid, of density 1.84 gm/ cm3 and containing 98 % by weight , should be taken to make 1 L of 2 N solution?**

**b. Calculate the formal concentration of: (a) an aqueous solution that contains (1.80 gm) of ethanol in 750 mL. (b) An aqueous solution that contains (0.365 gm) of Hydrochloric Acid in (50.0 mL) (the acid is 75.0 % ionized in this solution).**

**Q4 – Answer the questions:-**

**a. Calculate the hydrogen ion concentration of the solutions, pH values (3.47)?**

**b. Calculate the millimoles of (0.5 L) Sodium Sulfate in (1000 ppm)?**

**c. Calculate the weight in gram for (25 mL) dilute Nitric Acid (200 gm\mL)?**

**A.wt: - O =16, Na = 23, P = 31, Ca = 40, N = 14, Cl = 35.5, I = 127, H = 1, C = 12, and S = 32.**

**(WITH MY BEST WISHES)**

**حل أسئلة الأمتحان**

1. **Calculate the volume of a 0.232 N solution contains (a.) 3.17 milliequvalent of solute (b.) 6.5 equivalent of solute?**

**(a)**

1. **A solution contains (10 gm) Iodic Acid and (125 gm) Water, Calculate the concentration of solution expressed as: -**

**(a-) Mole fraction (X) of Iodic Acid. (b-) Molality.**

***Solution:***

**(a) Mol. HIO3 =wt / M.wt 10.0 /176 = 0.057 mol.**

**Mol. water =wt / M.wt 125 / 18.0 = 6.95 mol.**

**Sum of mole = 0.167+ 6.94 = 7.007 mole**

**(b) molality**

**molality =**

1. **How many (cm3) of concentrated sulfuric acid, of density 1.84 gm/ cm3 and containing 98 % by weight , should be taken to make 1 L of 2 N solution?**

**= 36.8 N.**

1. **Calculate the formal concentration of: (a) an aqueous solution that contains (1.80 gm) of ethanol in 750 mL. (b) An aqueous solution that contains (0.365 gm) of Hydrochloric Acid in (50.0 mL) (the acid is 75.0 % ionized in this solution).**

The only solute species present in significant amount in an aqueous solution of ethanol is C2H5OH, therefore;

**(b)**

**(100% ⎻ 75.0%) = 25%**

1. **Calculate the hydrogen ion concentration of the solutions, pH values (3.47)?**

**pH= -log [H+] = 6.372,**

**log [H+] = -3.47,**

**[H +] = 0.00034 = 3.4 × 10-4 M**

1. **Calculate the millimoles of (0.5 L) Sodium Sulfate in (1000 ppm)? Na2SO4**

**= 0.5 gm**

**No. of Moles = = = 0.0035 moles = 3.5 mmoles.**

**c. Calculate the weight in gram for (25 mL) dilute Nitric Acid (1.121 gm\mL)? HNO3**

**1.121 ppm**

**wt = 0.00003 gm**

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