

DEBRE MARKOS UNOVERSITY
NATURAL AND COMPUTATIONAL SCIENCE COLLEGE
CHEMISTRY DEPARTMENT

General chemistry (Chem1012) Assig for first year second semester students (chapter 3 only, 30%)

1. Analysis of a 14.03 g sample of a liquid compound composed of carbon, hydrogen and nitrogen showed it to contain 6.34g C, 1.58g H, and 3.50g N. What is the percent composition of this compound? (1pt)
2. What is the empirical formula for a compound containing 38.8% carbon, 16.2% hydrogen, and 45.1% nitrogen? (2pt)
3. A compound that contains 85.63% carbon and 14.37% hydrogen and its empirical molar mass is 56g/mole. What is its molecular formula? (2pt)
4. Calculate the empirical formula for the following (1pt each)
 - A) A 3.3700g sample of a salt which contains copper, nitrogen and oxygen was analyzed to contain 1.1418g of copper and 1.7248g of oxygen
 - B) A compound of nitrogen and oxygen that contains 30.43% nitrogen by weight
 - C) A compound of carbon, hydrogen and oxygen that contains 59.9% C, 8.06% H, 32.0% O
5. Find the percent composition of the element calcium (Ca) for the compound calcium hydroxide (Ca(OH)₂)? (1pt)
6. What volume of a 1.50M H₂SO₄ solution can be diluted to prepare 1.00 L of a solution with a concentration of 0.250M? (1pt)
7. Determine the molarity for each of the following solutions: (2pt each)
 - A) 0.456 mol of CoCl₂ in 0.654 L of solution
 - B) 94.0 g of sulfuric acid, H₂SO₄, in 1.00 L of solution
 - C) 0.2074 g of calcium hydroxide, Ca(OH)₂, in 40.00 mL of solution
 - D) 10.5 kg of Na₂SO₄·10H₂O in 18.60 L of solution
 - E) 7.0×10^{-3} mol of I₂ in 100.0 mL of solution
 - F) 1.8×10^4 mg of HCl in 0.075 L of solution
8. Wine is approximately 12% ethanol (CH₃CH₂OH) by volume. Ethanol has a molar mass of 46.06 g/mol and a density 0.789 g/mL. How many moles of ethanol are present in a 750-mL bottle of wine? (2pt)
9. A 60.0-g sample of industrial wastewater was determined to contain 0.58 mg of tungsten. Express the tungsten concentration of the wastewater in ppb and ppm units? (2pt)
10. Copper is commonly used to fabricate electrical wire. How many copper atoms are in 5.00 g of copper wire? Given that Avogadro's number (*N*_A) = 6.022×10^{23} /mol if necessary. (2pt)
11. According to nutritional guidelines from the Debre Markos Department of Agriculture, the estimated average requirement for dietary potassium is 5.7 g. What is the estimated average requirement of potassium in moles? (1pt)
12. Calculate the molecular or formula mass of each of the following: (1pt)
 - A) H₂O
 - B) Ca(NO₃)₂
 - C) CH₃CO₂H (acetic acid)
 - E) C₁₂H₂₂O₁₁ (sucrose)

Good Luck