University of Gondar

College of Natural and Computational Sciences

Department of Chemistry

General Chemistry (Chem. 1012) Assignment for 1st year natural science regular students.

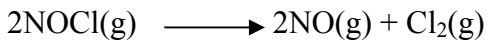
Show all the necessary steps as much as possible, total Weight 30%

1. What is the relationship between the dipole moment and bond moment? Explain it with examples, how is it possible for a molecule to have bond moments and yet be nonpolar? **(3 points)**
2. Define, distinguish and give an example for each of the following pairs of words **(4 points)**
   A. Homogeneous and heterogeneous mixture
   B. Extensive and intensive properties
   C. Saturated and unsaturated hydrocarbon
   D. Condensed and skeletal structure
3. A piece of silver metal weighing 194.3 g is placed in a graduated cylinder containing 242.0 mL of water. The volume of water now reads 260.5 mL. Calculate the density of the metal**. (2 points)**
4. A hypothetical element X is found to have an atomic mass of 37.45 amu. Element X has only two isotopes, X-37 and X-38. The X-37 isotope has a fractional abundance of 0.7721 and an isotopic mass of 37.24. What is the isotopic mass of the other isotope? **(3 points)**
5. For each of the following pairs of ions, write the formula and their corresponding IUPAC names of the compound they will form: **(2 points)**
   A. Na^{+} and S^{2-}.
   B. Ca^{2+} and O^{2-}
   C. Co^{3+} and SO_3^{2-}
   D. Cu^{2+} and NO_2^{-}
6. When heated, lithium reacts with nitrogen to form lithium nitride: **(4 points)**

   $Li(s) + N_2(g)$ ----------> $Li_3N(s)$

   What is the theoretical yield of Li3N in grams when 12.3 g of Li are heated with 33.6 g of N_2? If the actual yield of Li_3N is 5.89 g, what is the percent yield of the reaction?
7. For SF_2 molecule, draw the Lewis structure; determine molecular shape and electron pair arrangements **(3 points)**

8. 1.25 mol NOCl was placed in a 2.50 L reaction chamber at 427°C. After equilibrium was reached, 1.10 moles of NOCl remained. Calculate the equilibrium constant *K*c for the reaction. **(4 points)**



$$2NOCl(g) \longrightarrow 2NO(g) + Cl_2(g)$$

9. Arrange the compounds in each of the following groups in order of increasing acidity strength and explain the order you assign. **(2 points)**

   A. H_2O , H_2S, H_2Se , H_2Te

   B. HF, HCl, HBr, HI

10. Give the complete IUPAC name for each of the following compounds: **(3 points)**

   A. $CH_3CH_2CBr_2CH_3$

   B. $CH_3CHClCClBrCH_3$

   C. $(CH_3)_2CHCH_2CH{=}CH_2$