CP/Honors Chemistry Review for Midterm
Mathematical Problems

1. Density Problems:
   a. A substance has a density of 2.85 g/mL. What is the volume of a sample having a mass of 15.0 grams?
   b. A rectangular shaped object has the following measurements (length = 14.25 cm; width = 8.60 cm; height = 4.72 cm). The mass of the object is 45.72 grams. Calculate the density of the object. Would you expect the object to float in water?

2. Metric conversions:
   a. A paper clip has a length of 5.50 cm. How many meters is this? How many kilometers is this?

3. Percent Error:
   a. The melting point of a substance is experimentally determined to be 32.89°C. The actual/expected melting point of the substance is 35.96°C. Calculate the percent error of the measurement.

4. Electromagnetic Radiation:
   a. A radio station broadcasts at 107.5 MHz. What is the wavelength of the waves? (1 MHz = $1x10^6$ Hz)
   b. Visible light has a wavelength of 678 nm. What is the frequency of the waves? (1 nm = $1x10^{-9}$ m)

5. Average Atomic Mass:
   a. An element has three isotopes as shown below. Find the average atomic mass of the element rounded to the hundredths place.

Isotope	Percent abundance
X-144	9.9 %
X-145	24.8 %
X-147	65.3 %

   b. An element has two isotopes, Z-108 and Z-109, its weighted mass average is 108.7amu. Find the percent abundance of each isotope.

6. Mole Conversions
   a. Determine the mass of 0.912 moles of $Ca(OH)_2$.
   b. Determine the number of moles in 23.7 grams of NaBr.
   c. Determine the number of molecules in 195 grams of CH_4.

7. Percent Composition
   a. What is the percent composition (for all elements) in sucrose ($C_{12}H_{22}O_{11}$)?
   b. What is the percent aluminum in aluminum oxalate?

8. Empirical and molecular formulas
   a. A substance is analyzed by mass and found to contain 37.5% carbon, 12.6% hydrogen, and 49.9% oxygen. Find the empirical formula of the compound.
   b. A substance containing only sulfur and fluorine is analyzed and found to contain 18.0 grams of sulfur and 32.0 grams of fluorine. Find the empirical formula of the compound. If the molar mass of the compound is 178.1g/mol, what is the molecular formula of the compound?