Due: Monday, 11-September-2006 by the beginning of class. Please, this is to be your own work. These problems are in the style of the cumulative skills problems in your text, and are of the same degree of difficulty.

1) Obtain the fractional abundances for the two naturally occurring isotopes of gallium (Ga) The masses of the isotopes are: $^{69}\text{Ga}$ 68.925580 amu; $^{71}\text{Ga}$ 70.924700 amu. The atomic weight of gallium is 69.723 amu.

2) Natural chlorine, which has an atomic weight of 35.4527 amu, consists of chlorine-35 and chlorine-37 isotopes. Given that the mass of chlorine-35 is 34.96885 amu, what is the average atomic mass (in amu) of a chlorine sample prepared by mixing equal number of chlorine atoms from a sample of natural chlorine and a sample of pure chlorine-35?

3) Copper (II) sulfate pentahydrate has blue colored crystals. When heated carefully, it produces copper (II) sulfate anhydrous (= no waters), which has green crystals? What are the formulas of these hydrates? If 3.548 g of the pentahydrate yields 2.268 g of the anhydrous compound, how many grams of copper (II) sulfate monohydrate could have been obtained? (Possible if the heating was even more careful.)

4) A sample of metallic element X, weighing 5.315 g combines with 0.5925 L of Cl$_2$ gas (at normal pressure and 20.0°C) to form the metal chloride with the formula XCl. If the density of Cl$_2$ gas under these conditions is 2.948 g/L, what is the mass of the chlorine? The atomic weight of chlorine is 35.453 amu. What is the atomic weight of X? What is the identity of X?