AP Chemistry: *The Mole*

For each problem below, write the equation and show your work. Always use units and box in your final answer.

1. The molecular formula of aspartame, the artificial sweetener marketed as NutraSweet, is $C_{14}H_{18}N_2O_5$.

    a. What is the molar mass of aspartame?

    b. How many moles of aspartame are present in 1.00 mg of aspartame?

    c. How many molecules of aspartame are present in 1.00 mg of aspartame?

    d. How many hydrogen atoms are present in 1.00 mg of aspartame?

2. A sample of glucose, $C_6H_{12}O_2$, contains 2.03×10^{21} atoms of carbon.

    a. How many atoms of hydrogen does it contain?

    b. How many molecules of glucose does it contain?

    c. How many moles of glucose does it contain?

    d. What is the mass of the sample in grams?

3. How many moles of chloride ions are in 0.0750 g of magnesium chloride?

   b. What is the mass, in grams, of 3.50 10^{-3} mol of aluminum sulfate?

   c. What is the mass, in grams, of 1.75 x 10^{20} molecules of caffeine, $C_8H_{10}N_4O_2$?

   d. What is the molar mass of cholesterol if 0.00105 mol weigh 0.406 g?

4. Calculate the number of molecules in:
   a. 0.0666 mol propane, C_3H_8, a hydrocarbon fuel

   b. a 50.0 mg tablet of acetaminophen, $C_8H_9O_2N$, an analgesic solid under the name of Tylenol

   c. a tablespoon of table sugar, $C_{12}H_{22}O_{11}$, weighing 10.5 g

5. The allowable concentration level of vinyl chloride, C_2H_3Cl, in the atmosphere in a chemical plant is 2.0 x 10^{-6} g/L.
   a. How many moles of vinyl chloride in each liter does this represent?

   b. How many molecules per liter?