AP CHEMISTRY

TOPIC 1: CHEMICAL FOUNDATIONS, PART E

Day 6:

- Percent Composition
- Empirical formulas
- Molecular formulas

Homework problems:

1) Calculate the percent composition by mass of the following compounds:

   a) $C_3H_4O_2$ (acrylic acid, from which acrylic plastics are made)

   b) $C_2H_3Cl_3O_2$ (a drug that was once used as a sedative and hypnotic)

2) One of the most commonly used white pigments in paint is a compound of titanium and oxygen that contains 59.9% Ti by mass. Determine the empirical formula of this compound.

3) An unknown compound contains 716.5 grams of chlorine, 242.7 grams of carbon, and 40.7 grams of hydrogen (in that order the formula will be written). Determine the empirical formula for this compound.

4) A sample of diethylene glycol (antifreeze) contains 45.27 grams of carbon, 9.50 grams of hydrogen, and 45.23 grams of oxygen (in that order). Determine the empirical formula for this compound.

5)   What are the empirical formulas for these molecular formulas?

   a) N_6O_{15}

   b) $C_8H_{18}O_2$

6)   A compound containing only sulfur and nitrogen is 69.6% sulfur by mass; the molar mass is 184 grams per mole. What is the empirical formula and the molecular formula for this compound?

7)   A sample of hydroquinone, a chemical used in photography, contains 65.43 grams of carbon, 5.50 grams of hydrogen, and 29.1 grams of oxygen. What is the empirical formula and the molecular formula if the molar mass of the compound is 55.024 grams per mole?

8)   What is the molecular formula for each of the following?

   a) para-dichlorobenzene, used as a moth repellent, the empirical formula is C_3H_2Cl, the molecular mass is 147 grams / mole

   b) a compound that is 40.00% C, 6.71% H, and 53.29% O, by mass; molecular mass is 180 grams / mole.

9)   Many homes in rural America are heated with propane gas, a compound that contains only carbon and hydrogen (a hydrocarbon). Complete combustion of a sample of propane produced 2.641 grams of carbon dioxide and 1.442 grams of water as the only products. Find the empirical formula for propane. (hint: assume the coefficient for the hydrocarbon (that you are solving for) is ONE).