AP CHEMISTRY

TOPIC 1: CHEMICAL FOUNDATIONS, PART D

Day 5:

- Atomic Masses
- The mole
- Molar mass

Homework problems:

1) The atomic mass for sulfur is given in the periodic table as 32.06, yet no single atom of sulfur has a mass of 32.06 amu. Explain how this atomic mass is possible.

2) An element consists of 8.90% of an isotope with a mass of 203.0 amu, 1.50% of an isotope with a mass of 205.0 amu, 22.20% of an isotope with a mass of 206.0 amu, 50.50% of an isotope with a mass of 208.0 amu, and 16.90% of an isotope with a mass of 209.0 amu. Calculate the average atomic mass and identify the element.

3) Calculate the mass of 4000 atoms of iron.

4) Aluminum metal is produced by passing an electric current through a solution of aluminum oxide (Al_2O_3) dissolved in molten cryolite (Na_3AlF_6). Calculate the molar masses of Al_2O_3 and Na_3AlF_6.

5) Ascorbic acid, or vitamin C ($C_6H_8O_6$), is an essential vitamin. It cannot be stored by the body and must be present in the diet. What is the molar mass of ascorbic acid? **PART 2,** Vitamin C tablets are taken as a dietary supplement. If a typical tablet contains 500.0 mg of vitamin C, how many molecules does the tablet contain?

6) How many moles are represented in the following samples?

a) 150.0 grams of iron(III) oxide

b) 1.5×10^{20} molecules of sulfur trioxide

7) Aspartame is an artificial sweetener that is 160 times sweeter than sucrose (table sugar) when dissolved in water. It is marketed as Nutra-Sweet. The molecular formula for aspartame is $C_{14}H_{18}N_2O_5$.

a) Calculate the molar mass of aspartame

b) How many molecules of aspartame are present in 15.0 grams of aspartame?

c) How many atoms of nitrogen are in a 3.7 gram sample of aspartame?

d) What is the mass (in grams) of 1.0×10^{11} molecules of aspartame?