1. Some fundamental calculations:
   a. Calculate the number of oxygen atoms in a 288 amu sample.

   b. Calculate the mass (in amu) of 51 Na atoms.

   c. Calculate the number of moles in a sample with 5.00×10^{20} atoms of Cr.

   d. Calculate the mass of the sample in part (c).

   e. How many atoms of Si are in a 5.68 mg sample?

   f. How many grams of aluminum sulfate are in a 0.630 mol sample?

   g. How many moles are in 50.0 g sample of ammonium carbonate?

   h. What is the mass of one molecule of dinitrogen tetroxide?

2. Translate the following descriptions into a <u>balanced</u> chemical equation.
   a. Solid iron metal reacts with oxygen gas to produce solid iron (III) oxde.

   b. The combustion of solid iron (II) oxide produces solid iron (III) oxide.

   c. Solid potassium metal reacts with water to make hydrogen gas and aqueous potassium hydroxide.

   d. Propane gas combusts to give off carbon dioxide and water vapor.

   e. Dihydrogen sulfide gas is bubbled through an aqueous solution of lead (II) nitrate and solid lead (II) sulfide forms alongside aqueous nitric acid.

f. Sulfuric acid is poured onto solid aluminum to give off hydrogen gas and a solution of aluminum sulfate.

g. A copper wire dipped in a solution of silver (I) nitrate produces silver metal and copper (II) nitrate solution.

3. If you have equal masses of each compound (H_2SO_4, $C_{12}H_{22}O_{11}$, $KClO_3$), which sample has the greatest number of oxygen atoms?
(Note: There are two ways you can do this problem!)

4. Striking a match results in the following unbalanced chemical reaction:

$$\_\_\_\_ \ P_4\ (s) + \_\_\_\_ \ KClO_3\ (s) \rightarrow \_\_\_\_ \ KCl\ (s) + \_\_\_\_ \ P_2O_5\ (s)$$

a. Balance the equation above.

b. If 15.0 mg of P_2O_5 was produced in this reaction, what masses of P_4 and $KClO_3$ were required?

5. You react 10.0 g of hydrogen gas with 60.0 g of oxygen gas to form water. Determine the amount of water formed and the amount of excess reactant (both in grams) after the reaction is complete.

6. Consider mixing an excess of lead (II) nitrate (*aq*) with 0.0800 mol sodium chloride. Determine the mass of solid lead (II) chloride formed assuming a complete reaction.

7. The percent by mass of nitrogen is 46.7% for a species containing only nitrogen and oxygen. Which of the following could this species be?

   N_2O_5 N_2O NO_2 NO NO_3

8. If 5.00 g of CH_4 is burned, what mass of water can be produced?