Extra Problems for Chapter 7

1. Indicate how many moles are contained in each sample below:

    a. 100.0 grams of silicon
    b. 150.0 grams of water (H_2O)
    c. 500.0 grams of glucose ($C_6H_{12}O_6$)

2. Determine the mass of each sample below:

    a. 5.41 moles of sulfur
    b. 0.12 moles of potassium chloride (KCl)
    c. 1.761 moles of ethanol (C_2H_6O)

3. How many atoms are found in 500.0 grams of magnesium?

4. How many molecules exist in 10.0 grams of aluminum chloride ($AlCl_3$)?

5. A chemist has 5.0×10^{25} molecules of ammonia (NH_3). How many moles is that? How many grams is that?

6. The hydrate of sodium carbonate (Na_2CO_3) has ten water molecules for every sodium carbonate molecule.

    a. Write the chemical formula of hydrated sodium carbonate.
    b. If you have 50.0 grams of the anhydrous form, how many grams of water can it absorb?

7. The formation reaction for sodium sulfate (Na_2SO_4) is given below:

$$2Na + S + 2O_2 \rightarrow Na_2SO_4$$

If you want to make 10.0 moles of Na_2SO_4:

    a. How many moles of sodium would you need?
    b. How many moles of sulfur would you need?
    c. How many moles of oxygen would you need?

8. A chemist is making hydrogen according to the following chemical equation:

$$Mg\ (s) + 2HCl\ (aq) \rightarrow MgCl_2\ (aq) + H_2\ (g)$$

If he adds 15 moles of HCl (aq) to an excess of Mg (s), how many moles of H_2 (g) will he make?

9. Consider the following reaction:

$$3NaOH\ (aq)\ +\ H_3PO_4\ (aq)\ \rightarrow\ Na_3PO_4\ (aq)\ +\ 3H_2O\ (l)$$

How many grams of H_3PO_4 (aq) are necessary to make 100.0 moles of water?

10. A chemist is using the following reaction

$$2Al\ (s) + 3CuSO_4\ (aq)\ \rightarrow\ Al_2S_3O_{12}\ (aq) + 3Cu\ (s)$$

to make copper (Cu). If he uses 100.0 grams of aluminum and excess $CuSO_4$, how many grams of copper can he make?

11. A chemist is running the following chemical reaction:

$$4NH_3 +\ 5O_2\ \rightarrow\ 4NO\ +\ 6H_2O$$

If she wants to make 15.0 g of water, how much NH_3 does she need?