CHEM 1364
Test #2
Fall 2008 (Buckley)

Show your work on all numerical problems to receive credit.

1. (10 points) Name each of the following compounds.

   a. BaCO₃ _____________ _______________________________
   b. HCl __________ __________________________________
   c. Cu(OH)₂ ________________ ____________________________
   d. SF₅ _____________ _______________________________
   e. (NH₄)₃PO₄ ________________ ____________________________
   f. Fe₂O₃ _____________ _______________________________
   g. Cr₂(SO₄)₃ ________________ ____________________________
   h. KNO₃ _____________ _______________________________
   i. IF₃ _____________ _______________________________
   j. SrF₂ _____________ _______________________________

2. (5 points) Write the formula for each of the following named compounds.

   a. cesium hydroxide _________________________________
   b. barium nitrate _________________________________
   c. indium (III) sulfide _________________________________
   d. magnesium chlorate _________________________________
   e. sulfur tetrafluoride _________________________________
3. (10 points) Balance each of the following chemical equations.

\[
\text{Na}_3\text{PO}_4 \text{(aq)} + \text{BaI}_2 \text{(aq)} \rightarrow \text{Ba}_3(\text{PO}_4)_2 \text{(s)} + \text{NaI(aq)}
\]

\[
\text{S}_8 \text{(s)} + \text{Cl}_2 \text{(g)} \rightarrow \text{S}_2\text{Cl}_2 \text{(g)}
\]

\[
\text{Be} \text{(s)} + \text{O}_2 \text{(g)} \rightarrow \text{BeO} \text{(s)}
\]

\[
\text{BaCl}_2 \text{(aq)} + \text{AgNO}_3 \text{(aq)} \rightarrow \text{Ba(NO}_3)_2 \text{(aq)} + \text{AgCl} \text{(s)}
\]

\[
\text{CH}_3\text{NH}_2\text{(g)} + \text{O}_2 \text{(g)} \rightarrow \text{H}_2\text{O} \text{(g)} + \text{CO}_2 \text{(g)} + \text{N}_2 \text{(g)}
\]

4. (10 points) Make each of the following conversions. Show your work.

a. How many molecules of CH₃CH₃ are required to obtain 150.0 g of CH₃CH₃?

b. How many grams of bromine are contained in 250.0 g of BaBr₂?

c. How many grams of CH₂Br₂ are contained in 1.45 x 10⁻² mol of CH₂Br₂?

d. How many F atoms are contained in 35.0 g of CF₄?

e. Which contains more grams of S: 15.0 g of H₂S or 25.0 g of H₂SO₄?
5. (5 points) A compound is found to have a composition of 52.2% C, 13.0% H, and 34.8% O. The molar mass of the compound is 276. Find both the empirical formula and molecular formula for the compound.

6. (10 points) Sodium nitrate decomposes according to the reaction:

\[ 2 \text{NaNO}_3 \, (s) \rightarrow 2 \text{NaNO}_2 \, (g) + \text{O}_2 \, (g) \]

35.0-g of sodium nitrate are decomposed. Answer the following questions in relation to this reaction.

a. How many grams of NaNO₂ could be formed in the reaction?

b. How many moles of oxygen could be formed in the reaction of the 35.0-g of sodium nitrate?

c. Suppose the reaction is carried out with 35.0-g of sodium nitrate and 21.2-g of NaNO₂ are formed, what is the percent yield of NaNO₂?
7. (10 points) The Haber-Bosch reaction is an important industrial process.

\[ 3 \text{H}_2 (g) + \text{N}_2 (g) \rightarrow 6 \text{NH}_3 (g) \]

a. 4.50-g of H₂ is allowed to react with 10.50-g of N₂. Which of these is the limiting reactant? SHOW YOUR WORK.

b. How many grams of NH₃ could be produced from the reactants in part a?

c. How many grams of the excess reactant would remain after the reaction of part a?

d. If after the reaction of part a only 10.5-g of NH₃ are formed, what is the percent yield?