Name __________________________

CHEM 1364 (Night)
Test #2
Spring 2010 (Buckley)

Point totals for each question are listed to the right of the problem number. Show your work on numerical problems to receive credit.

1. (5 points) Classify each of the following salts as soluble (S) or insoluble (I).
   
   BaI₂ ___________________________ CaCO₃ ___________________________
   
   NaHC₂O₄ _______________________ Cr(NO₃)₃ _________________________
   
   SrSO₄ __________________________

2. (10 points) Epinephrine (adrenaline), hormone secreted into the bloodstream in times of danger or stress, contains 59.0% C, 7.1% H, 26.2% O, and 7.7% N by mass and its molar mass is 177 g/mol. Find the empirical formula and molecular formula for epinephrine. Show your work.
3. (16 points) Show your work on the following.

a. What is the mass of 5.45-mol of CHF₃?

b. How many oxygen atoms are contained in 12.3-g of CO₂?

c. How many carbon atoms are contained in 100 molecules of C₈H₁₆O₂S²? (Read this carefully!)

d. How many grams of O are contained in 3.45-mol of P₂O₅?
4. (16 points) For each of the following equations:
   - Write the correct formulas for the products, including the state (s, ℓ, aq) (2 points)
   - Balance the equation (1 point)
   - Write the complete ionic equation (4 points)
   - Write the net ionic equation (1 point)

   \[ \text{K}_3\text{PO}_4 (aq) + \text{BaI}_2 (aq) \rightarrow \]

   \[ \text{AgNO}_3 (aq) + \text{AlCl}_3 (aq) \rightarrow \]
5. (10 points) Show your work throughout this problem. The conversion of ammonia (NH₃) to NO is an important step in the commercial production of nitric acid. The chemical equation for this step is:

\[ 4 \text{NH}_3 (g) + 5 \text{O}_2 (g) \rightarrow 4 \text{NO} (g) + 6 \text{H}_2\text{O} (g) \]

a. Suppose the reaction is carried out with 50.05 g of NH₃ and 95.05 g of O₂. Which is the limiting reactant? Show your work. Don’t make me guess – tell me which one is the limiting reactant.

b. How many grams of NO could be produced based on the reactant amounts in part a?

c. How many grams of the excess reactant would remain at the end of the reaction in part a?

d. If 62.85 g of NO are actually produced, what is the percent yield?