

Name: \_\_\_\_\_

**Chemistry 121**  
**Spring2003**  
**Exam II**  
**50 minutes/100 pts**

**I. MULTIPLE CHOICE:** (30 pts, 3 points each) Carefully and clearly circle the best answer.

1. A precipitate will form when an aqueous solution of ammonium sulfate is mixed with an aqueous solution of:
  - a. NaCl
  - b.  $\text{NaNO}_3$
  - c. LiCl
  - d.  $\text{BaCl}_2$
  - e. KCl
  
2. Which of these bases dissociates 100% in water?
  - a.  $\text{Mg(OH)}_2$
  - b. RbOH
  - c. CsOH
  - d. LiOH
  - e.  $\text{Fe(OH)}_3$
  
3. Which of the following is a weak acid?
  - a.  $\text{NH}_3$
  - b. HCl
  - c.  $\text{HClO}_4$
  - d.  $\text{HNO}_3$
  - e.  $\text{CH}_3\text{COOH}$
  
4. In an oxidation-reduction reaction, a reducing agent:
  - a. loses electrons
  - b. gains electrons
  - c. loses protons
  - d. gains protons
  - e. is reduced
  
5. Which pair of reagents could be used in an aqueous solution to prepare solid lead (II) chloride?
  - a.  $\text{Pb(NO}_3)_2 + \text{NaClO}_4$
  - b.  $\text{NaCl} + \text{K}_2\text{S}$
  - c.  $\text{NaCl} + \text{Pb(NO}_3)_2$
  - d.  $\text{AgF} + \text{Pb(NO}_3)_2$
  - e.  $\text{PbSO}_4 + \text{KOH}$
  
6. Which of the following is not a characteristic of an acid?
  - a. Produces  $\text{CO}_2$  when added to limestone
  - b. Dissolves most metals, evolving  $\text{H}_2$
  - c. Acts as a proton acceptor
  - d. Tastes sour
  - e. Acts as a proton donor

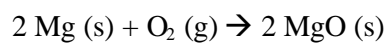
7. Which of the following compounds is soluble in aqueous solution?
- BaCO<sub>3</sub>
  - Fe<sub>2</sub>O<sub>3</sub>
  - CuSO<sub>4</sub>
  - PbCl<sub>2</sub>
  - AgI
8. Phosphorous trichloride may be prepared by the reaction of phosphorous with chlorine gas according to the equation below. When the equation is properly balanced with the smallest whole numbers, the respective coefficients are:
- \_\_\_\_\_ P<sub>4</sub> + \_\_\_\_\_ Cl<sub>2</sub> → \_\_\_\_\_ PCl<sub>3</sub>
- 2, 6, 8
  - 1, 3, 4
  - 2, 3, 2
  - 1, 6, 4
  - 3, 9, 3
9. \_\_\_\_\_ are balanced in a chemical equation.
- Atoms and molecules
  - Molecules
  - Moles
  - Atoms
  - Atoms and moles
10. What reactant is the oxidizing agent in the following reaction?
- 2 Fe + 3 Cr<sup>2+</sup> → 3 Cr + 2 Fe<sup>3+</sup>
- Fe
  - Cr<sup>2+</sup>
  - Cr
  - Fe<sup>3+</sup>
  - Not a redox reaction

**II. Short Answers and Calculations** (80 pts): Clearly indicate your answer in the space provided. Partial credit will be given for correct work. If I cannot read the work, it will not be graded.

- (15 pts) Write the complete, total ionic and net ionic equations for the reaction of aqueous sodium carbonate with aqueous barium nitrate.
  - Complete
  
  
  
  
  
  
  
  
  
  
  - Total Ionic
  
  
  
  
  
  
  
  
  
  
  - Net Ionic
- (5 pts) In a titration, when the number of moles of OH<sup>-</sup> added exactly equals the number of moles of H<sup>+</sup>, the researcher has reached the \_\_\_\_\_.
- (5 pts) Write the balanced reaction for the combustion of butane, C<sub>4</sub>H<sub>10</sub>.

4. (5 pts) Define stoichiometry.
5. (10 pts) Eric Cartman is still trying to pass fourth grade. In science lab, he reacts acetic anhydride with salicylic acid to make aspirin. The reaction has a theoretical yield of 10.0g. Eric produced 1.10g of aspirin. Calculate the percent yield of Eric's reaction.
6. (10 pts) Write the balanced equation for the reaction of Acetic Acid ( $\text{CH}_3\text{CO}_2\text{H}$ ) with Potassium Hydroxide (KOH).
7. (10 pts) What volume of 0.166 M  $\text{Ba}(\text{OH})_2$  is needed to neutralize 1.00 L of 0.261 M  $\text{HNO}_3$ ?  
$$\text{Ba}(\text{OH})_2 (\text{aq}) + 2 \text{HNO}_3 (\text{aq}) \rightarrow \text{Ba}(\text{NO}_3)_2 (\text{aq}) + 2 \text{H}_2\text{O} (\text{l})$$

8. (10 pts) How many grams of magnesium oxide are produced from the reaction of 5.00g of Mg with 2.50g of molecular oxygen? (MM of Mg = 24.31 g/mol, MM of O<sub>2</sub> = 32.00 g/mol, MM of MgO = 40.31 g/mol)



9. (10 pts) How many grams of silver chloride are produced when 25.00 mL of 0.250 M AgNO<sub>3</sub> are reacted with excess AlCl<sub>3</sub>? (MM of AgCl = 110.37 g/mol)

