Name: _____

Chemistry 121
Fall 2003
Exam 2
75 minutes/100 pts

FORM A

Instructions: You have 75 minutes to complete this 100-point exam. Indicate your exam form on the line marked "SUBJECT" on the scantron. NO CALCULATORS OF ANY KIND ALLOWED.

I. MULTIPLE CHOICE: (80 pts, 4 points each) Indicate the best answers on the scantron using a #2 pencil.

1. When the following equation is balanced, what is the number that appears before the symbol Sn^{2+}?
   a. 2
   b. 3
   c. 4
   d. 5

   ? Sn^{2+} + **?** PO_4^{3-} → $Sn_?(PO_4)_?$

2. The ions present in solid silver chromate, Ag_2CrO_4, are
   a. Ag^+ and CrO_4^{2-}
   b. Ag^+, Cr^{6+} and O^{2-}
   c. Ag^{2+} and CrO_4^{4-}
   d. Ag^+, Cr^{3+} and O^{2-}

3. How many moles of Fe are needed to produce 10.0 mol of H_2?
   a. 7.50 mol
   b. 13.3 mol
   c. 13.0 mol
   d. 15.0 mol

   $4\ H_2O + 3Fe \rightarrow Fe_3O_4 + 4H_2$

4. What volume 0.550 M $MgCl_2$ contains 1.1 moles of $MgCl_2$?
   a. 0.605 L
   b. 2.00 L
   c. 0.500 L
   d. 1.65 L

5. How many milliliters of 10.0 M HCl are required to make 100.00 mL of 0.200 M HCl?
   a. 1.00 mL
   b. 10.0 mL
   c. 5.00×10^3 mL
   d. 2.00 mL

6. The balanced equation for the complete combustion of cyclohexane is:
   a. $C_6H_{12} + 18\ O_2 \rightarrow 6\ CO_2 + 6\ H_2O$
   b. $C_6H_{12} + 9\ O_2 \rightarrow 6\ CO_2 + 6\ H_2O$
   c. $C_6H_{12} + 6\ O_2 \rightarrow 6\ CO_2 + 6\ H_2O$
   d. $2\ C_6H_{12} + 18\ O_2 \rightarrow 12\ CO_2 + 6\ H_2O$

7. In a balanced chemical equation, what is balanced?
    a. Atoms
    b. Moles
    c. Molecules
    d. Atoms and molecules

8. When the equation below is properly balanced, the respective coefficients are:
    a. 2, 1, 1, 6
    b. 2, 3, 1, 6 ___ NH_3 + ___ F_2 → ___ N_2F_4 + ___ HF
    c. 2, 5, 1, 6
    d. 2, 10, 1, 6

9. What is the actual yield of a reaction that has a percent yield of 78.6% and a theoretical yield of 52.3 g?
    a. 66.5 g
    b. 41.1 g
    c. 1.50×10^3 g
    d. 26.3 g

10. Which of the following is a strong base?
    a. $Fe(OH)_3$
    b. $Zn(OH)_2$
    c. $Sr(OH)_2$
    d. $Al(OH)_3$

11. Which of the following is predicted to be insoluble in water?
    a. NaBr
    b. K_2SO_4
    c. FeS
    d. $(NH_4)_2S$

12. Which of these acids will dissociate 100%?
    a. $C_6H_5CO_2H$
    b. H_3SO_3
    c. CH_3CO_2H
    d. HF

13. The correct chemical formula of potassium sulfide is:
    a. KS
    b. K_2S
    c. KSO_4
    d. K_2SO_4

14. A solution that conducts electricity is called a (n)
    a. Electrolyte.
    b. Nonelectrolyte.
    c. Precipitate.
    d. Coefficient.

15. Given the following balanced reaction, which reactant is limiting if you have 4.0 mol Mg and 4.0 mol O_2?
    a. Mg
    b. O_2 $2Mg + O_2 \rightarrow 2\ MgO$
    c. MgO
    d. None

16. The reaction of silver nitrate and magnesium chloride produces _____ as a precipitate.
    a. $Mg(NO_3)_2$
    b. $MgCl_2$
    c. AgCl
    d. $AgNO_3$

17. All the following compounds are soluble in water except for:
    a. Na_3PO_4
    b. $Fe(ClO_4)_2$
    c. $MnCl_2$
    d. $CaSO_4$

18. In an acid-base titration, the point at which the moles of base added equal the moles of acid is called the:
    a. Indicator point.
    b. End point.
    c. Buret point.
    d. Acid point.

19. The net ionic equation for the neutralization of nitric acid with iron (II) hydroxide is:
    a. $2\ HNO_3 + Fe(OH)_2 \rightarrow 2\ H_2O + Fe(NO_3)_2$
    b. $HNO_3 + OH^- \rightarrow H_2O + NO_3^-$
    c. $2\ H^+ + Fe(OH)_2 \rightarrow 2\ H_2O + Fe^{2+}$
    d. $H^+ + OH^- \rightarrow H_2O$

20. Acetic acid (CH_3CO_2H) is a(n):
    a. Strong acid.
    b. Weak acid.
    c. Nonelectrolyte.
    d. Common indicator.

II. Balancing and Calculations (30 pts, 10 pts each): 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.

1. Write the complete, total ionic and net ionic equation for the reaction of sodium sulfate with barium chloride.

Complete: _____

Total Ionic: _____

Net Ionic: _____

2. What mass of iron (III) sulfide is produced from the reaction of 11.6g of iron(III) nitrate with 0.0500 L of 0.875 M sodium sulfide? (MM of $Fe(NO_3)_3$ = 241.88 g/mol, MM of Fe_2S_3 = 207.88 g/mol)

$$2\ Fe(NO_3)_3 + 3\ Na_2S \rightarrow Fe_2S_{3\ (s)} + 6\ NaNO_3$$

3. If 10.0 L of 6.0 M NaOH neutralizes 15.0 L of carbonic acid, what is the molarity of the acid?

$$2\ NaOH + H_2CO_3 \rightarrow 2\ H_2O + Na_2CO_3$$