

Chemistry 121
Spring 2005
Test 2, FORM A

Name: KEY

Instructions: You have 75 minutes to complete this 100-point exam. You may use a simple scientific calculator. No programmable calculators allowed.

I. Multiple Choice (15 pts, 3 points each) Carefully and clearly circle the best answer. If you circle two answers, *one of which is correct*, you will receive 1 point.

1. Which reaction represents the balanced net ionic reaction of TiCl_2 with $\text{Pb}(\text{NO}_3)_2$?

- D
- a. $\text{Ti}^{2+} + 2 \text{NO}_3^- \rightarrow \text{Ti}(\text{NO}_3)_2 (\text{s})$
 - b. $\text{Ti}^{4+} + 4 \text{NO}_3^- \rightarrow \text{Ti}(\text{NO}_3)_4 (\text{s})$
 - c. $\text{Pb}^+ + \text{Cl}^- \rightarrow \text{PbCl} (\text{s})$
 - d. $\text{Pb}^{2+} + 2 \text{Cl}^- \rightarrow \text{PbCl}_2 (\text{s})$
 - e. None of the above.

2. Which reaction represents the balanced net ionic reaction of HNO_3 with $\text{Fe}(\text{OH})_3$?

- B
- a. $\text{H}^+ + \text{OH}^- \rightarrow \text{H}_2\text{O}$
 - b. $3 \text{H}^+ + \text{Fe}(\text{OH})_3 \rightarrow 3 \text{H}_2\text{O} + \text{Fe}^{3+}$
 - c. $\text{HNO}_3 + \text{OH}^- \rightarrow \text{H}_2\text{O} + \text{NO}_3^-$
 - d. $\text{HNO}_3 + \text{Fe}(\text{OH})_3 \rightarrow \text{H}_2\text{O} + \text{Fe}(\text{NO}_3)_3$
 - e. None of the above.

3. If a reaction has a 73.2% yield and the actual yield was 23.4 g, what is the theoretical yield?

- C
- a. 0.320 g
 - b. 3.13 g
 - c. 32.0 g
 - d. 1710 g
 - e. None of the above

$$\frac{23.4 \text{ g}}{x} = 0.732$$

4. Which of the following is not a polyprotic acid?

- D
- a. H_2SO_4
 - b. H_3PO_4
 - c. H_2CO_3
 - d. HNO_3
 - e. None of the above

5. An acid-base reaction can also be referred to as:

- C
- a. An oxidation-reduction.
 - b. A precipitation.
 - c. A proton transfer.
 - d. An indicator.
 - e. None of the above.

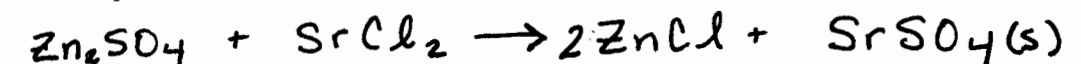
II. Solubility, Precipitates and Chemical Reactions

1. (10 pts) In the table below, indicate if a precipitate will form when $\text{Fe}(\text{NO}_3)_3$ is mixed with the ionic compounds in column "X". If a precipitate forms, give the formula of the precipitate.

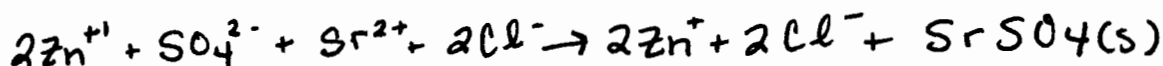
X	$\text{Fe}(\text{NO}_3)_3$	
	Will ppt form? (Y/N)	Formula of ppt
AlCl_3	N	—
Na_2CO_3	Y	$\text{Fe}_2(\text{CO}_3)_3$
K_2SO_4	N	—
Li_3PO_4	Y	FePO_4
AgNO_3	N	

2. (15 pts) Write the balanced complete, total ionic and net ionic equations for the reaction of zinc (I) sulfate with strontium chloride.

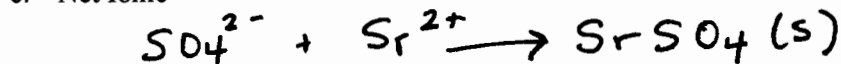
a. Complete



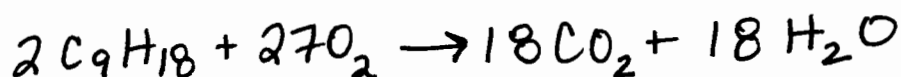
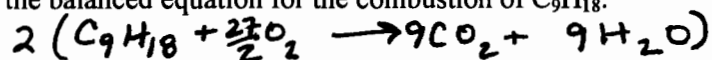
b. Total Ionic



c. Net Ionic

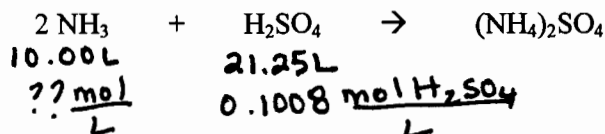


3. (5 pts) Write the balanced equation for the combustion of C_9H_{18} .



III. Calculations: Show all work in the space provided. Partial credit will be given for correct work. If I cannot read the work, it will not be graded.

1. (15 pts) Most window cleaners are aqueous solutions of ammonia, NH_3 . A 10.00 L sample of a particular window cleaner requires 21.25 L of 0.1008 M H_2SO_4 for its titration. What is the molarity of the ammonia in the window cleaner? The balanced reaction is given below.



$$21.25\text{L} \times \frac{0.1008 \text{ mol H}_2\text{SO}_4}{\text{L}} \times \frac{2 \text{ mol NH}_3}{1 \text{ mol H}_2\text{SO}_4} = 4.284 \text{ mol NH}_3$$

$$\frac{4.284 \text{ mol NH}_3}{10.00\text{L}} = \boxed{0.4284 \text{ M NH}_3}$$

