

**Test 2, Chemistry 121**  
**Spring 2006**

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

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

**I. Solubility (10 pts):** Indicate whether the following compounds are soluble in water.

1. $\text{Na}_3\text{PO}_4$	Soluble	Insoluble	6. $\text{AgCl}$	Soluble	Insoluble
2. $\text{ZnCl}_2$	Soluble	Insoluble	7. $\text{TiNO}_3$	Soluble	Insoluble
3. $\text{FeCrO}_4$	Soluble	Insoluble	8. $(\text{NH}_4)_2\text{CO}_3$	Soluble	Insoluble
4. $\text{Ca}(\text{OH})_2$	Soluble	Insoluble	9. $\text{AlPO}_4$	Soluble	Insoluble
5. $\text{PbSO}_4$	Soluble	Insoluble	10. $\text{MgSO}_4$	Soluble	Insoluble

**II. Writing and Balancing Equations**

1. (15 pts) Write the balanced molecular, total ionic and net ionic equations for the reaction of lead (II) nitrate with potassium bromide. (make sure you identify the solid precipitate)

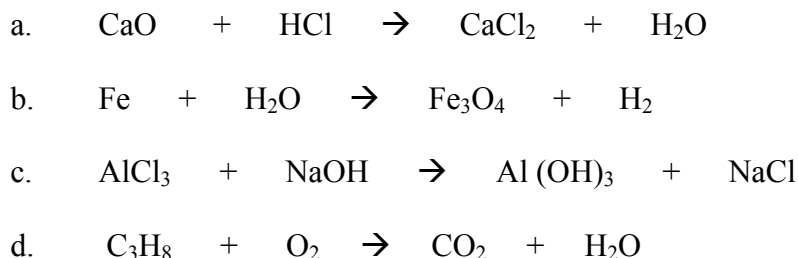
Molecular: \_\_\_\_\_

Total Ionic: \_\_\_\_\_

Net Ionic: \_\_\_\_\_

2. (5 pts) Write the balanced molecular equation for the reaction of sodium hydroxide with hydroiodic acid (HI).

3. (20 pts) Balance the following equations:



**III. Calculations** – show all work for partial credit

1. (15 pts) Sodium thiosulfate pentahydrate,  $\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$  is used in photography development.
- a. Calculate its molar mass. (show all work)

b. A solution of  $\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$  has a concentration 0.500 M. How many grams of  $\text{Na}_2\text{S}_2\text{O}_3 \cdot 5\text{H}_2\text{O}$  are in 15.0 mL of the solution? (Use the MM from part a)

2. (10 pts) Propylene glycol ( $\text{CH}_3\text{CHOHCH}_2\text{OH}$ ) is used as a safe alternative to ethylene glycol, the main ingredient in antifreeze. How many molecules of propylene glycol are in 5.0 mg of  $\text{CH}_3\text{CHOHCH}_2\text{OH}$ ? (MM of  $\text{CH}_3\text{CHOHCH}_2\text{OH} = 76.09 \text{ g/mol}$ )

3. (15 pts) Silicone bracelets have become extremely popular in the last two years. The basic molecular unit of these bracelets is dimethylsiloxane  $(\text{CH}_3)_2\text{Si}(\text{OH})_2$ . This is made by reacting dimethyl dichlorosilane,  $(\text{CH}_3)_2\text{SiCl}_2$ , with water. How many grams of  $(\text{CH}_3)_2\text{Si}(\text{OH})_2$  are prepared by the reaction of 10.0g of  $(\text{CH}_3)_2\text{SiCl}_2$  with 5.00g of water? (MM of  $(\text{CH}_3)_2\text{SiCl}_2 = 129.06 \text{ g/mol}$ , MM of  $\text{H}_2\text{O} = 18.02 \text{ g/mol}$ , MM of  $(\text{CH}_3)_2\text{Si}(\text{OH})_2 = 92.17 \text{ g/mol}$ )



4. (10 pts) What volume (in mL) of 0.955 M HCl is required to exactly neutralize 15.0 mL of 0.596 M  $\text{Ca}(\text{OH})_2$ ?



5. (10 pts) Determine the empirical formula of a compound that contains 53.5 % Xe and 46.5 % F.

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