

**Lab: Types of Chemical Reactions****Safety is very important when combining chemicals**

**Students: Please read the following information given below, and then come to class on your lab day with the following already prepared in your notebooks:**

- 1) Date, 2) Partner, 3) Title, 4) Purpose, 5) Materials, 6) Safety, 7) Diagram, and
- 8) Procedures/Observations 9) Printed copy of solubility chart (cut and pasted)

**The questions need to be printed out. The questions will be done after completion of the experiment. These page(s) will be submitted one week after performing the lab in class (your next lab class). The solubility chart will assist you in answering the post lab questions.**

Although countless chemical reactions exist, nearly all of them can be classified into a few specific categories. This experiment will allow one to differentiate the five general types of chemical reactions. Two different types of reactions will be performed, the others will be identified through chemical equations. From observations, identify the products of each reaction and determine the type of reaction that has taken place. Make sure the five general types of chemical reactions are known before beginning lab.

**Experiment 1: Lead (II) Nitrate and Sodium Iodide**

Be sure to follow all safety procedures for glassware, chemicals, etc.

Obtain two test tubes (one of Lead (II) Nitrate and the other of Sodium Iodide) from the teacher and place them in your test tube rack back at your lab station. Once both test tubes have been obtained, make observations of both test tubes. Finally, pour the Sodium Iodide into the Lead (II) Nitrate test tube and then record your observations immediately. Perform the next experiment, and at the end of Exp. 2, observe the test tube again. Record your observations.

Figure 1

**Experiment 2: Zinc and Hydrochloric Acid**

Be sure to follow all safety procedures for glassware, acids, fire, etc.

Set up a ring stand with a test tube securely placed in a clamp. The test tube clamp should be secured about 6 inches up from the base of the stand (See Figure 1).

Pick up a test tube with HCl from the teacher's desk and place into clamp.

Obtain a small amount of zinc on scoopula (1 tablet).

Carefully slide zinc into HCl and collect any gas generated in a dry inverted test tube. Make sure to use a large test tube holder to hold the inverted test tube as close as possible to the test tube that is clamped on. It is advised to tape the inverted test tube to the large test tube holder to secure it on. Once the reaction has occurred for about 5 minutes, place a lit splint near opening of the inverted test tube. Make sure not to turn the inverted test tube upright, otherwise, the gas that was collected will be lost! Hint: Have lit splint ready then remove inverted test tube and place lit splint near the opening.



Name \_\_\_\_\_

Date \_\_\_\_\_

Period \_\_\_\_\_

Lab Group # \_\_\_\_\_

**Lab: Types of Chemical Reactions****Questions: Print out and answer in the spaces provided.**

1. Name the five general types of chemical reactions and give a basic equation for each. (5 pts)

A. \_\_\_\_\_ Equation: \_\_\_\_\_

B. \_\_\_\_\_ Equation: \_\_\_\_\_

C. \_\_\_\_\_ Equation: \_\_\_\_\_

D. \_\_\_\_\_ Equation: \_\_\_\_\_

E. \_\_\_\_\_ Equation: \_\_\_\_\_

2. Answer the following questions for the chemical reaction that occurred in **Experiment 2**: (5 pts)

a. Write out the word equation.

b. Write out the chemical formula equation.

c. Balance the above reaction and identify all states of matter.

d. What type of chemical reaction occurred?

e. What gas was generated by the chemical reaction?

Name \_\_\_\_\_

Date \_\_\_\_\_

Period \_\_\_\_\_

Lab Group # \_\_\_\_\_

**Lab: Types of Chemical Reactions****Questions: Print out and answer in the spaces provided.**3. Answer the following questions for the chemical reaction that occurred in **Experiment 1**: (8 pts)

- a. Write out the word equation.
  
  
  
  
  
  
  
  
  
  
- b. Write out the chemical formula equation.
  
  
  
  
  
  
  
  
  
  
- c. Balance the above reaction and identify all states of matter. (Use Table 11.3 on pg 344)
  
  
  
  
  
  
  
  
  
  
- d. What type of chemical reaction occurred?
  
  
  
  
  
  
  
  
  
  
- e. What color is the Lead (II) Nitrate solution?
  
  
  
  
  
  
  
  
  
  
- f. What color is the Sodium Iodide solution?
  
  
  
  
  
  
  
  
  
  
- g. How did you know a chemical reaction happened?
  
  
  
  
  
  
  
  
  
  
- h. What was observed after 5 minutes? Describe with details.

Name \_\_\_\_\_

Date \_\_\_\_\_

Period \_\_\_\_\_

Lab Group # \_\_\_\_\_

**Lab: Types of Chemical Reactions****Questions: Print out and answer in the spaces provided.**

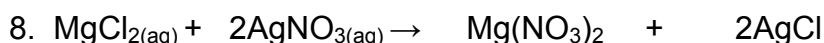
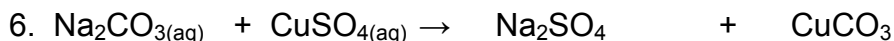
4. Using the solubility chart, PREDICT: (2 pts)

a.  $\text{MgSO}_4$  is soluble or insoluble \_\_\_\_\_b.  $\text{Co}(\text{OH})_2$  is soluble or insoluble \_\_\_\_\_c.  $\text{Zn}(\text{NO}_3)_2$  is soluble or insoluble \_\_\_\_\_d.  $\text{K}_2\text{CO}_3$  is soluble or insoluble \_\_\_\_\_

5. Using the solubility chart, determine whether the following compounds are aqueous (aq) or solid (s): (2 pts)

a.  $\text{PbCO}_3$  \_\_\_\_\_b.  $\text{Cu}(\text{OH})_2$  \_\_\_\_\_c.  $\text{MgI}_2$  \_\_\_\_\_d.  $\text{BaSiO}_3$  \_\_\_\_\_

Complete the following reactions, by filling in (aq) or (s) where needed: (3 pts—1 pt each)



9. In questions 6-8, Circle any precipitates that have formed in the reactions. (4 pts)

10. Define a precipitate. (1 pt)

## Table of Solubilities in Water

## Anions

Cations	Anions															
	Acetate $C_2H_3O_2^{-1}$	Bromide $Br^{-1}$	Carbonate $CO_3^{-2}$	Chlorate $ClO_3^{-1}$	Chloride $Cl^{-1}$	Chromate $CrO_4^{-2}$	Hydroxide $OH^{-1}$	Iodide $I^{-1}$	Nitrate $NO_3^{-1}$	Oxide $O^{-2}$	Oxalate $C_2O_4^{-2}$	Phosphate $PO_4^{-3}$	Silicate $SiO_3^{-2}$	Sulfate $SO_4^{-2}$	Sulfide $S^{-2}$	Sulfite $SO_3^{-2}$
Aluminum $Al^{+3}$	S	S	--	S	S	--	I	S	S	I	I	I	I	S	D	--
Ammonium $NH_4^{+1}$	S	S	S	S	S	S	--	S	S	--	P	S	--	S	S	S
Antimony $Sb^{+3}$	--	D	--	--	S	--	--	D	--	P	I	--	--	D	D	--
Arsenic $As^{+3}$	--	D	--	--	D	--	--	S	--	P	--	--	--	--	I	--
Barium $Ba^{+2}$	S	S	I	S	S	I	S	S	S	S	I	I	S	I	D	I
Bismuth $Bi^{+3}$	I	D	--	--	D	--	D	I	D	I	D	I	I	D	I	--
Cadmium $Cd^{+2}$	S	S	I	S	S	I	I	S	S	I	I	I	I	S	I	P
Calcium $Ca^{+2}$	S	S	I	S	S	S	I	S	S	I	I	I	I	I	I	I
Chromium(III) $Cr^{+3}$	S	S	--	--	S	--	I	I	S	I	S	P	--	S	I	I
Cobalt(II) $Co^{+2}$	S	S	I	S	S	I	I	S	S	I	I	I	I	S	I	I
Copper(II) $Cu^{+2}$	S	S	I	S	S	S	I	--	S	I	I	I	--	S	I	--
Iron(III) $Fe^{+3}$	--	S	--	--	S	S	I	--	S	I	S	I	--	S	I	--
Iron(II) $Fe^{+2}$	S	S	I	--	S	I	I	S	S	I	I	I	I	S	I	I
Lead(II) $Pb^{+2}$	S	I	I	S	P	I	I	I	S	I	I	I	I	I	I	I
Magnesium $Mg^{+2}$	S	S	I	S	S	S	I	S	S	I	I	I	I	S	D	S
Mercury(II) $Hg^{+2}$	S	P	I	S	S	P	--	I	S	I	I	--	--	D	I	--
Mercury(I) $Hg_2^{+2}$	I	I	I	S	I	I	--	I	D	I	I	--	--	I	I	--
Nickel(II) $Ni^{+2}$	S	S	I	I	S	--	I	S	S	I	I	I	--	S	I	I
Potassium $K^{+1}$	S	S	S	S	S	S	S	S	S	D	S	S	S	S	S	S
Silver $Ag^{+1}$	P	I	I	S	I	I	--	I	S	I	I	I	--	I	I	I
Sodium $Na^{+1}$	S	S	S	S	S	S	S	S	S	D	S	S	S	S	S	S
Strontium $Sr^{+2}$	S	S	I	S	S	I	I	S	S	I	I	I	I	I	I	I
Zinc $Zn^{+2}$	S	S	I	S	S	I	I	S	S	I	I	I	I	S	I	I