

NAME:

## HONORS CHEMISTRY

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SECTION:

Minilab: Ionic Names and Formulas

Chemical substances are described not only by unique names but also by chemical formulas. A chemical name will describe a unique chemical formula and a chemical formula will have a unique chemical name. We use this language to communicate about chemistry.

All ions, of which some substances are made, have unique chemical names, as well. Most transition metals and the representative elements tin and lead are type II ions--they form two or more cations. To distinguish between different cations of the same element, a Roman numeral is used in the name to indicate the numerical value of the charge.

Cations and anions combine in a ratio that makes all ionic compounds electrically neutral. Formulas for ionic compounds are written so that the positive charge contributed by the cations exactly balances the negative charge contributed by the anions. For example, the formula for the ionic compound formed from  $\text{Na}^+$  cations and  $\text{O}^{2-}$  anions is  $\text{Na}_2\text{O}$ . The formula for the cation is always written first. The subscript, 2, refers to two  $\text{Na}^+$  ions that exactly balance the 2- charge on one  $\text{O}^{2-}$  ion. To name an ionic compound, state the name of the cation and the name of the anion. Don't forget to use a Roman numeral to specify the numerical value of the positive charge of those atoms that form more than one cation (i.e., Type II compounds).

In this lab, you will synthesize several ionic compounds, and write their names and formulas.

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### Objectives

- Microscale synthesis of ionic compounds
- Write names and formulas of Type I, Type II and ternary ionic compounds

### Materials

Micro-scale stirring rods  
micropipettes  
Small-scale reaction surface  
Solutions of various ionic compounds

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### Procedure

1. Place 1 drop of each solution on a small-scale reaction surface on top of the experimental page. Stir using a clean micro-scale stirring rod.
2. Combine the ions to write the formulas of the chemical compounds that are produced by the mixings.
3. What happened with each mixing? Record your observations in Table 1.
4. Write the cation, anion, formula and name of each compound produced by the reactions in Table 2.

### Analyze and Apply Questions

1. Element X forms ions with charges of +1 and +2. Element Y forms ions with charges of -2 and -3. List all the possible formulas for compounds of X and Y.



Prepare the reaction mixtures as described in your lab handout in the indicated spaces below.

Table 1: Observations	$\text{AgNO}_3$ ( $\text{Ag}^+$ )	$\text{Pb}(\text{NO}_3)_2$ ( $\text{Pb}^{2+}$ )	$\text{CuSO}_4$ ( $\text{Cu}^{2+}$ )	$\text{CrCl}_3$ ( $\text{Cr}^{3+}$ )	$\text{Fe}(\text{NO}_3)_3$ ( $\text{Fe}^{3+}$ )
NaCl ( $\text{Cl}^-$ )					
KBr ( $\text{Br}^-$ )					
NaOH ( $\text{OH}^-$ )					
$\text{Na}_2\text{CO}_3$ ( $\text{CO}_3^{2-}$ )					
$\text{Na}_3\text{PO}_4$ ( $\text{PO}_4^{3-}$ )					

