

# Chemistry CP

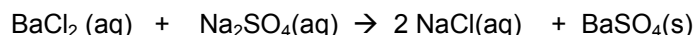
Name: \_\_\_\_\_

Lab: Precipitation in Double Displacement Reactions

Section: \_\_\_\_\_

In chemistry, the term precipitation does not refer to meteorological phenomena such as rain or snow. Rather, *precipitation* occurs in solution when two chemicals react to form a product that is insoluble in water and falls out of solution like rain or snow. A *precipitate* is a solid substance that separates from solution during a chemical reaction. A precipitate can be identified by the cloudy, milky, gelatinous, or grainy appearance it gives to the mixture. The solid might even settle to the bottom of the container.

A barium sulfate precipitate can be produced by the reaction of barium chloride and sodium sulfate. A chemical equation to describe the reaction is written and balanced as follows:



Barium sulfate,  $\text{BaSO}_4$ , is a common precipitate used as an X-ray contrast medium because it is insoluble in water and opaque to X-rays. Typically, a patient drinks an aqueous slurry of barium sulfate just before he or she is X-rayed. The precipitate coats the stomach and intestines, so the organs show up on the X-ray film in vivid contrast.

Notice that the reaction that forms  $\text{BaSO}_4$  is a double-displacement reaction in which the cations and the anions of the reactants trade partners to form the products. You should also take note that the ratios in which the cations and anions combine to form reactants are different from the ratios for the products. For example,  $\text{Na}^+$  combines with  $\text{SO}_4^{2-}$  in a ratio of 2:1 in sodium sulfate, whereas  $\text{Na}^+$  combines in a 1:1 ratio in sodium chloride,  $\text{NaCl}$ . According to the rules of formula writing, formulas for ionic compounds must be written so that the net charge of the formula is zero.

In this lab, you will carry out a number of double displacement reactions using microscale techniques to mix various solutions. You will observe and describe the precipitates that are formed, using a solubility table to determine the identity of the precipitate. Finally, you will write and balance complete chemical equations to describe the precipitation reactions.

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## Objectives

- Observe precipitation reactions by mixing aqueous solutions of cations and anions.
- Write and balance complete chemical equations to describe precipitation reactions.

## Safety

- Wear your safety glasses.
- Use full microscale pipettes only for the carefully controlled delivery of solutions.
- Silver nitrate can stain the skin, so avoid contact with this solution.

## Materials

Small scale reaction surface

Micropipettes of the following solutions: (You will choose 7 of these solutions for this lab)

Lead (II) nitrate  
Potassium iodide  
Sodium hydroxide  
Sodium sulfate  
Sodium carbonate  
Calcium chloride

Silver nitrate  
Sodium chloride  
Iron (III) chloride  
Sodium phosphate  
Copper (II) sulfate



