**Discovering the Solubility Rules (Investigation 10A)**

Chemists can often predict the products of a reaction by just looking at the formulas of the reactants. Sometimes when you mix two aqueous salt solutions one of the products formed is a solid called a **precipitate**. The ions in solution that do not form a precipitate are called spectator ions. In this laboratory you will see that some ions in solution are soluble and that others are insoluble. The insoluble ions form a solid precipitate in solution. Being able to predict these reactions allows scientists to calculate what ions are present in a solution, and allows industries to form chemicals by extracting certain elements from these reactions. If one knows that a precipitate is formed when a chemical reacts to form a precipitate with lead, for example, one could test for lead in water sources by seeing if a precipitate forms. In addition, precipitation reaction s can be used to extract elements, such as magnesium from seawater. Precipitation reactions even occur in our bodies between antibodies and antigens. In this lab, you will perform several chemical reactions by combining sets of salt solutions. From your observations, you will generate a list of soluble and insoluble substances. By analyzing patterns and making some generalizations, you will develop your own set of **solubility rules**.

Precipitate!

1. Based on what you read in the text, what does the term “soluble” mean? (If you are unsure, look this term up in your text)
2. If an ion is insoluble, what will you find after you mix the solution?
3. According to the reading, in what three situations could using solubility rules be useful and applicable?



1. In what other ways do you think finding certain elements would be useful?
2. What will you be doing in this lab?

**Part 1: Mixing solutions**

Precipitate!

1. Using the Data table below as a guide, mix 1-2 drops of each solution listed across the top with 1-2 drops of each solution listed down the side on a transparency sheet. Mix each pair of solutions one at a time. Be careful to keep track of which ones you are mixing. Record the color and consistency of the precipitate that forms from mixing two solutions and write “PPT” for the precipitate reaction. If there is no precipitate write “NR” for “no reaction”.
2. When your done is full rinse the transparency with water.. Dry your transparency with a paper towel.



**Part 2: Writing the chemical equations**

1. Review: What is the difference between a reactant and a product when writing a chemical equation?
2. Refer to your data table and write down the balanced chemical equation for six reactant mixes that resulted in a precipitate. Use the solubility table to identify the precipitate.

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| Reactants | 🡪 | Products | Precipitate |
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1. Look in your text. What is a cation? Anion? Which one ALWAYS gets written FIRST in a formula? Write the cations and anions present in each precipitate from number 2.
2. Refer back to your pre-lab questions, what does the term “solubility” mean?