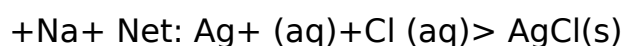


Solubility and spectator ions

[Science](#), [Chemistry](#)



Precipitates are electrically uncharged. In this experiment all of the precipitates result from the exchange of positive and negative ions between reacting solutions of two ionic compounds. Thus, in this example the precipitate must be either silver chloride, AgCl or sodium nitrate, NaNO₃. Sodium nitrate dissolves readily in water and is therefore soluble. Thus we can conclude that silver chloride is the insoluble precipitate. We can represent the formation of this precipitate by a net ionic equation: Ag⁺ + NO₃⁻ + Na⁺ + Cl⁻ > AgCl + NO₃⁻



Ions present in the solution but not involved in forming the precipitate are called spectator ions; in our example these would be Na⁺ and NO₃⁻. Spectator ions are not recorded in net ionic equations. To help identify (or predict) which compounds are soluble or insoluble most chemistry texts contain solubility rules and tables. Basic Solubility Rules:

- A. Nitrates: All nitrate salts are soluble.
- B. Alkali metals: The salts of lithium, sodium, potassium, rubidium, and cesium are generally very soluble.
- C. Ammonium salts: Almost all ammonium salts are soluble.
- D. Sulfates: The sulfates of most common elements are soluble, except those of calcium, strontium, barium, and lead (II) ions. Hydroxides: Most of the hydroxides are insoluble, except those of the alkali metals and barium; calcium hydroxide is moderately soluble.

F. Halides: The chloride, bromide, and iodide salts are generally soluble, except those of silver, lead (II), and mercury (I) ions. G.

Sulfides: Most sulfides are insoluble, except from alkali metals and ammonium ion.

H. Acetates: All acetates are soluble, except silver acetate, which is slightly soluble.

I. Silver salts: All silver salts are insoluble, except silver nitrate, silver nitrite, and silver perchlorate. Silver acetate and silver sulfate are slightly soluble.

J. Carbonates: All carbonates are insoluble, except those of ammonium, sodium, potassium, and the other alkali metals. K. Phosphates: Phosphates are insoluble, except those of ammonium, sodium, potassium, and the other alkali metals.

If there is no Auxiliary (Aux) Chemicals Bag in the LabPaq, skip the following steps for chemical dilutions, as your chemicals are already diluted to the molarity needed for this experiment. If the LabPaq contains an Auxiliary (Aux) Chemicals Bag, follow the procedures below to dilute the chemicals to the molarity needed for this experiment. Auxiliary Chemical Dilutions: Before you begin this experiment, prepare the chemicals from the auxiliary chemicals bag as instructed below: First dilute the 6 M NaOH (sodium hydroxide) to 0.

1 M in one well of the 24-well plate: add 1 drop of 6M NaOH directly from the auxiliary bottle, and then using the empty unlabeled pipet add 59 pipet drops of distilled water. Next, read through the following procedures and then draw a data table in your notebook to record your observations about

any precipitates or gases that form when the two solutions are combined. Remember to include color for precipitates. Examine the reactions against both dark and white backgrounds. If there is no reaction for that combination of solutions write NR (no reaction).