EXPERIMENT A: Net Ionic Equations

PURPOSE:

1. To distinguish between an overall equation, a total ionic equation and a net ionic equation.
2. To write an overall equation, a total ionic equation and a net ionic equation for double replacement reactions.

PRINCIPLES:

The most common method to represent a chemical reaction is a ***balanced chemical equation***. This equation is commonly referred to as an ***overall*** or ***molecular*** equation. This equation describes the chemical reaction in general terms, but it may not describe the precise chemical changes that occur at the molecular or ionic levels. This is because the species that actually experiences the chemical change may be an ion, which is only part of the compound from which it is obtained. In order to distinguish between substances that are present as ions in solution and those that exist as molecules or as ionic solids, an ***ionic equation*** is written. A ***total ionic equation*** includes all chemical species actually present at the scene of a reaction except the solvent water, which is neither a reactant nor a product, but merely the medium in which the reaction occurs. Not all species at the reaction scene undergo chemical change. Substances which are present but experience no chemical change are called **spectators**.
A ***net ionic equation*** is an equation in which spectators are removed from the total ionic equation. The net ionic equation shows only those reactants that are actually consumed and those products that are actually formed in the reaction.

In this experiment you will direct your attention to writing net ionic equations. In net ionic equations it is necessary to clearly show the state of a reactant or product by writing the state designation. The state designations are written after the formula of the species in the equation: (s) for solids, (l) for liquids, (g) for gases, and (aq) for aqueous solutions

In order to represent chemical compounds correctly in ionic equations, one must recognize whether a compound will be present in ionic or molecular form.

PROCEDURE:

Each part of the experiment (except number 12) consists of mixing equal volumes of two solutions, about 20 drops of each solution into a test tube. Record your observations directly into your notebook. If no sign of chemical reaction, indicate NO Reaction.

For each reaction that you see observation, write molecular equation, overall ionic equation, and net ionic equation, make sure to include physical states for reactants and products for each molecular, complete ionic, and net ionic equation.

1. Mix 0.1 M sodium chloride and 0.1 M potassium nitrate solutions.
2. Mix 0.1 M sodium chloride and 0.2 M silver nitrate solutions.
3. Mix 0.1M sodium carbonate and 6 M HCl solutions.
4. Mix 10% sodium hydroxide and 6 M HCl solutions.
5. Mix0.1 M barium chloride and 3 M sulfuric acid solutions.
6. Mix 6 M ammonium hydroxide and 3 M H_2SO_4 solutions.
7. Mix 0.1 M copper (II) sulfate and0.1 M zinc nitrate solutions.
8. Mix0.1 M sodium carbonate and 0.1 M calcium chloride solutions.
9. Mix 0.1 M copper (II) sulfate and 0.1 M ammonium chloride solutions.
10. Mix 10% sodium hydroxide and 3 M nitric acid solutions.
11. Mix0.1 M iron (III) chloride and 6 M ammonium hydroxide solutions.
12. **DO THIS IN THE HOOD**: Place a few crystals of solid sodium sulfite into the test tube. Add drop wise, about 20 drops of 6 M hydrochloric acid solution to solid sodium sulfite, and observe.