#### ANION ANALYSIS

#### OBJECTIVES FOR THE EXPERIMENT

The student will be able to do the following:

- Write a general description of the qualitative analysis technique for identification of unknown substances.
- Plan a procedure for the analysis of an unknown solution of an anion and describe that procedure with a flow chart.
- Identify different anions using a qualitative analysis technique.

#### BACKGROUND

There are two main branches of analytical chemistry, qualitative analysis and quantitative analysis. Qualitative analysis involves the experimental determination of the nature of the substances in a sample. It answers the question, what's in there? Quantitative analysis involves the determination of how much of a substance is present in a sample. A chemist might test the water downstream from an out-fall of a chemical plant. The first step would be to do qualitative analysis techniques to determine whether it contains pollutants. The next step would be to use quantitative analysis techniques to find out if the concentrations were high enough to cause concern.

The goal of this experiment is to develop techniques for identifying unknown substances. You will identify unknown solutions as containing one of the following: CI\*, Br\*, I\*, HPO<sub>4</sub>2\*, or SO<sub>4</sub>2\*.

You will do the following general steps.

- 1. You will first do tests with solutions that you know contain one of the anions.
  - a. You will determine how the anions react with silver nitrate and barium nitrate.
  - You will determine whether precipitates dissolve in acidic solutions.
  - c. You will determine how Br and I react with chlorine, Cl2.
- Based on the observations made on these "knowns", you can devise a plan to analyze each of your unknowns. You will describe this plan with a flow chart. See below.
- 3. You will then do tests on three unknown solutions to determine which anion is in each solution.

The general reactions in this experiment consist of two doubledisplacement reactions and one oxidationreduction reaction as shown below:

In the silver nitrate and barium nitrate tests, you will watch for the possible formation of the precipitates AgX, Ag2X, BaX2, or BaX. The colors of these precipitates can be quite helpful. The appearance of any solids in these tests will show that a reaction has occurred. Even a slight cloudiness is an indication of a positive test.

If a precipitate forms in a silver nitrate or barium nitrate test, you will add nitric acid to see if the ionic compound will dissolve. If the anion is basic, the ionic compound should dissolve. When a solid ionic compound precipitates from a solution, the ions do not remain permanently in the ionic solid. Ions are constantly escaping from the solid into solution, and ions are constantly colliding with the solid and returning to the solid. These two changes occur at the same rate, so there is not normally any net change in the amount of solid in

# **Anion Analysis Lab Report**

**Louise Ferguson, David Haviland** 



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