7.5 Qualitative Chemical Analysis

Definitions

- Qualitative
- Quantitative
- Qualitative chemical analysis
- Limiting reagent
- Excess reagent

Application

- Testing blood alcohol level – how much alcohol?
- Municipal water supply – is it safe?

Qualitative Analysis by Colour

- Become familiar with the colours of specific ions in solution (Table 1 on page 341).
- Become familiar with the colours of specific ions in a flame test (Table 3 on page 342).
- E.g. Cu^{2+} solutions are blue and it produces a green flame.
- The flame test is important in determining the presence of specific ions.
- Robert Bunsen (Bunsen burner) was one of the people responsible for the development of spectroscopy.
- Bunsen's spectroscopy has further developed into sophisticated piece of equipment called a spectrophotometer.

Sequential Qualitative Chemical Analysis

- A series of reactions that are used to precipitate low-solubility products.
- Prescriptive procedure that helps determine the presence of ions. The precipitate could be further analyzed to determine concentration.

Test for the Presence of Lead (II) Ions

- A sample may contain Pb^{2+} and/or Sr^{2+}
    - Add NaCl to precipitate lead. If a precipitate forms, filter and if desired determine mass of the $PbCl_{2(s)}$ formed.
    - Add Na_2SO_4 to precipitate strontium. If a precipitate forms, filter and if desired determine the mass of the $SrSO_{4(s)}$ formed.

Summary of Procedure (From Textbook)

- Locate the possible cations on the solubility table.
- Determine which anions precipitate the possible cations.
- Plan a sequence of precipitation reactions that uses anions to precipitate a single cation at a time.
- Use filtration between steps to remove cation precipitates that might interfere with subsequent additions of anions.
- Draw a flow chart to assist your testing and communication.
- If you are testing for anions, repeat the procedure above but reverse the words cations and anions.

Homework

- Practice 1-3, 5-7
- Section 1-10