Lab : Determination of a Solubility Product Constant

When you were a very young (and very curious) child, you watched your mother put some salt into a pot of boiling water when making potatoes or rice. You asked, "Mommy, is there a limit to the molar concentration of sodium chloride in water?" When she replied that there was, you asked, "How can I quantitatively measure the extent of this limit?" She smiled at you, saying, "You'll have to wait until the Grade 12 Chemistry solubility unit to find that out." You did, and now you eagerly ask again.

The purpose of this lab test is to determine the value of K_{sp} of a salt, which is either KCl or K_2SO_4.
You will not be told which salt is given to you.
You must therefore perform two sets of calculations, one for KCl and another for K_2SO_4.

This experiment is to be done in pairs (to be assigned by the teacher), but each student is to submit their own lab report.

Procedure:

1. Using a 25 mL graduated cylinder, measure as accurately as possible between 15 and 20 mL of saturated salt solution and record the volume in the table below.

2. Weigh a clean, dry evaporating dish and watch glass cover, recording the mass in the table.

3. Pour the salt solution into the evaporating dish. Rinse the graduated cylinder with 2 or 3 mL of distilled water and add the rinsings to the evaporating dish.

4. Cover the evaporating dish with the watch glass and, using a hot-plate, heat the dish carefully until all the liquid has evaporated. (Be careful of "bumping"!!)

5. Allow the evaporating dish to cool for 2 or 3 minutes. (If you can hold it, you can weigh it!). Weigh the dish, contents and cover, recording the mass in the table below.

Data:

1. Volume of salt solution (mL) -_____

2. Mass of empty dish cover (g) -_____

3. Mass of dish, cover & salt (g) -_____

Assignment

Each student will submit their own lab report which must include at least the calculation of the number of moles of salt present in your sample, the calculation of the sodium ion and chloride ion concentrations, and the calculation of the value of the solubility product constant.
You must also include a discussion of MAJOR sources of experimental error.