

## Stoichiometry Lab #3 (Formal): Predicting a Precipitate; SC2 d,e



**Introduction:** This will be your second lab exploring the concept of limiting reactants. Again, a limiting reactant is defined as one of the reactants in a chemical reaction that will be used up first. The purpose of this lab is to determine the amount of precipitate that will be produced when a given amount of calcium chloride and sodium sulfate are mixed. Please note that you will be using a centrifuge in this lab. Please ensure that you follow lab safety protocol at all times and be very careful with centrifuge. Please also note that this is a formal lab that must be typed. I recommend that you take picture throughout the lab to include in your final report, which will include a rerun section.

**Pre-Lab:** Once you have massed the calcium chloride and the sodium sulfate you will need to do each of the following before you proceed with the rest of the experiment.

- Write the balanced chemical reaction noting the states of matter for all substances. (See solubility chart to determine which substance precipitates.)
- Determine which reagent, calcium chloride or sodium sulfate, is limiting.
- Predict the amount of the precipitate that will be produced.

Once you have done these three things, show them to your instructor. Then you may begin the experiment.

### Procedure

1. Label and mass a test tube. The test tube must be completely dry
2. Obtain about 0.30 grams of each reagent (It doesn't matter how much you get just as long as you know exactly how much you obtain), and determine both which reagent is limiting and how much precipitate you will discover.
3. Dissolve the calcium chloride into 3 mL of distilled water by carefully flicking the test tube. Alternatively, you may use the vortex on a low level. Dissolve the sodium sulfate into 3-mL of distilled water.
4. Pour the sodium sulfate solution into the test tube with calcium chloride in it. Take care to get all of the sodium sulfate into the calcium chloride test tube.
5. Remove the stopper and then place your sample into a centrifuge and spin out the precipitate. (Caution should be used in using this device. Your teacher will instruct you on proper use of a centrifuge)
6. Decant, or pour off, the liquid (supernatant) above the precipitate. Be careful not to allow any of the precipitate to be poured out.
7. Add about 10-mL of distilled water to your precipitate and spin it again. Decant again and repeat this step two more times for a total of four centrifuges. This will rinse the precipitate.
8. Show your product to your teacher for approval. Set your labeled test tube into a drying oven overnight.
9. Weigh your test tube and determine the mass of the precipitate that you have. Compare this amount to what you expected to get from your calculations.

**Calculations:** Show all calculations needed to determine the expected amount of precipitate required to do the experiment. This should include the balanced chemical reaction and all appropriate stoichiometric calculations.

**Post Lab Questions:** You do not have to answer these separately, just be sure to include them in your lab report (rerun).

Q1. Why did you have to mass the test tube prior to beginning the experiment?

Q2. Why did you need to add water to the solid calcium chloride and solid sodium sulfate to cause the reaction to occur?

Q3. Comment on sources of error.

Q4. What was your percentage of error?

Q5. Draw a picture (unless you took pictures) of the two test tubes prior to adding the two chemicals. What had happened to the calcium chloride? What happened to the sodium sulfate?

Q6. Now draw a picture (unless you took pictures) of the test tube once you have mixed the two chemicals. Where are all of the chemicals now? Label this in your diagram.

### **Conclusion:**

Use the ideas below to help you create an **RERUN outline** to draft your conclusion before you type it in paragraph format as part of this formal lab report.

**Recall** what your group did during this lab (think about the procedures and calculations).

**Explain** why you did this lab and what you were trying to find out (refer to the purpose).

**Reflect** on the lab's meaning and your results (what did you determine) and did it match your hypothesis or was your hypothesis rejected? Why?

**Uncertainty** (errors that were in the lab that you could not control or just any errors that you came across during this lab that you could fix for the next time you perform the lab). This should be very specific and related to the procedures. *For this lab, reflect on the answers for post lab questions #1-6. Think about differences between group's data, included human error, among other reasons, that would cause percentage error or discrepancies in data.*

**New questions or new discoveries** (normally you put in at least two) generated from this lab.