

Mole Lab #2: Calcium Sulfate Precipitate; SC2 b, c, d



As you know, the unit of measure for the amount of a substance is the mole. A mole is 6.02×10^{23} particles (such as atoms or molecules). The mass of one mole of any substance is found using the periodic table to calculate the molar mass. The purpose of this lab is to measure chemical quantities using the mole and to observe evidence of a chemical change. You will need to read through the entire procedure and answer the pre-lab questions before beginning this lab.

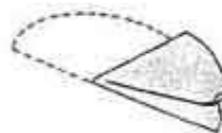
Materials: small test tubes, balance, weigh boat, CaCl_2 , Na_2SO_4 , dH_2O , two beakers (100-250 mL), funnel, filter paper, Erlenmeyer flask (~150 mL)

Pre-lab Questions:

Q1. Convert 0.0183 moles of calcium chloride to grams (nearest 0.1 g). **SHOW WORK**

Q2. Convert 0.0142 moles of sodium sulfate to grams (nearest 0.1 g). **SHOW WORK**

Q3. Predict the products and write the balanced equation for the reaction. Next write the complete and net ionic equations for this reaction. Do not forget the states of matter.



Procedure:

1. Weigh 0.0183 moles of calcium chloride and place in one 100-250 mL beaker
2. Weigh 0.0142 moles of sodium sulfate and place in another 100-250 mL beaker
3. Add 25 mL of distilled water (dH_2O) to each beaker.
4. Stir each mixture with a glass stirring rod until the chemical inside it dissolves. After both substances have **completely** dissolved pour the sodium sulfate solution into the calcium chloride solution.
5. Record qualitative observations while continuing to stir for another 5 minutes. At this time your lab partner needs to clean your lab bench. Also clean and return the beaker that is not being used.
6. You should see evidence of a chemical reaction. Record more qualitative data as appropriate.
7. As you learned during the Honors Chemistry scavenger hunt, make a funnel out of the filter paper.
8. Obtain the mass of the filter paper and record this data for later use. Also write your initials on the filter paper.
9. Place a small funnel into the Erlenmeyer flask and place the filter paper funnel into the small plastic funnel.
10. Start filtering the solution. Rinse the filter paper with small amounts of dH_2O to ensure that the entire chemical product is as pure as possible. Carefully rinse the product to the bottom center of the filter paper.
11. Remove the filter paper and place into an incubator oven overnight.
12. Clean everything in your work area and dispose of remaining solutions with copious water (Flinn Safety #26B)
13. Next day: Obtain the mass of the filter paper with the chemical product. Record this data. Record the mass of the actual CaSO_4 . Dispose of the product in the trashcan.

Post-lab Questions:

Q4. What is the evidence that a chemical reaction occurred during this lab? In general, what are some other signs that a chemical reaction has occurred? Are there any of these signs that you feel always indicate a chemical reaction has occurred? Justify your response.

Q5. Calculate the number of moles of CaSO_4 that were formed in your reaction. Show all work.

Q6. Matter is neither created nor destroyed. Consider the balanced chemical equation from Q3 and the actual masses of the reactants that you added in this lab. Calculate the mass of sodium chloride product that was experimentally formed in the reaction. Next calculate the number of moles of sodium chloride that were formed. Show all of your work.

Q7. Do you feel that the calculations that you used in Q6 were accurate? Please defend your response and be sure to expound on any potential sources of error in your methodology.