

Chemistry 1: Lab 1

One Tube Reactions

Background Information:

In this experiment, you will set up a mixture of chemicals and materials that you will observe for a period of six days. A **written record** of the changes that occur will include two sections: **(1)** a physical description of all chemicals in their present state **(2)** a daily description of all changes which occurred from the moment that the procedure was completed until the conclusion of the experiment on the sixth day.

Safety:

- Be sure to follow set-up instructions and precautions as discussed by your instructor!
- While none of these chemicals are dangerous in the given quantities, they could cause stains if spilled, or possible skin irritation if handled with your bare hands.

Procedure:

(1) Obtain the following in a zip lock bag:

- 1 test tube
- 3 squares of Parafilm™
- 1 iron nail (sand it at home with steel wool or sandpaper to remove any protective coating or rust)
- copper sulfate (blue crystals)
- sodium chloride (white crystals)

(2) Slide the copper sulfate crystals to the bottom of the test tube with a paper funnel as demonstrated in class. The tube should be about 1/3 full.

(3) Using a pencil, push some tissue paper into the test tube so as to cover the blue crystals.

(4) Slowly, and with as little disturbance as possible, add enough water to just cover the paper and the blue crystals. This will work best if the test tube is held at an angle at a slowly dripping water faucet.

(5) Hold the test tube at an angle and carefully slide the sodium chloride crystals into the test tube with a paper funnel, filling the tube another 1/3 full.

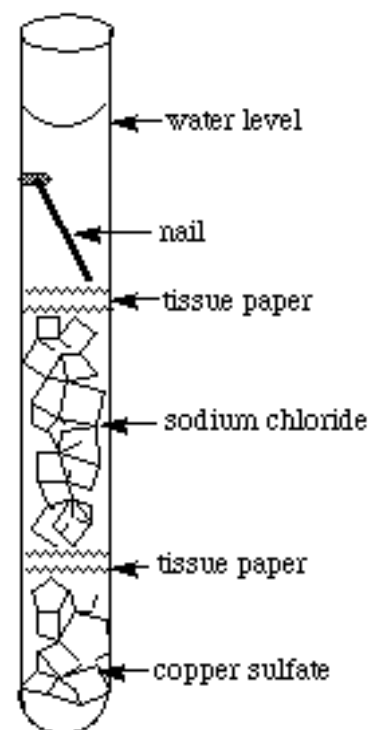
(6) Push more tissue paper into the test tube on top of the white crystals.

(7) Add enough water (as in procedure #4) to cover the white crystals.

(8) Slide the nail into the test tube. Continue adding water until it covers the nail completely.

(9) Cover the test tube with 2 layers of parafilm and record your observations.

Set-up



IMPORTANT: Set the test tube experiment **labeled** with your name in the designated test tube rack and record your observations daily.

A video demonstrating the experimental set-up with images of the daily changes in appearance of the initial reactants as well as the substances recovered during the separation procedures is available at

https://youtu.be/5kpsr_WzL2g

Lab Separation Procedures

Objective:

to learn separation techniques by separating and recovering the substances used in the one test tube experiment.

Procedure:

1. You and your partner(s) pour the contents of your one-tube experiments into one 250 ml beaker. You may need to add a small amount of water first and break up the solids with a scoop. Place all empty test tubes in the designated recycling area. Add 100 ml of tap water to the beaker and heat it on a wire-gauze/ ring-clamp/ ring-stand set-up. Stir this mixture occasionally. Stop heating in two minutes. Many of the solids in the test tube should dissolve, while insoluble materials will be left at the bottom of the beaker.
2. Use a pencil to label one sheet of filter paper with your name(s). Set up a filtration apparatus, using a ring clamp to hold the funnel. Filter a few drops of your mixture into a test tube. The solution that passes through the filter paper is called the *filtrate*. GENTLY heat this test tube until dry. Record the results.
3. Continue to collect about 50 mL of the filtrate into a Florence flask. Then transfer some of the solid to the filter paper with a scoop or spoon. After filtering, open the filter paper and spread it out while still wet, on your watch glass or porcelain dish. Allow the filter paper and the solids to dry under a heat lamp. The solids in the filter paper are called the *residue*. Discard everything else from the beaker in the designated waste container. Clean up this beaker today or it will be impossible next time!
4. Add a few boiling stones to the filtrate in the Florence flask. Set up a distillation apparatus using a rubber stopper with a bent glass tube (or flexible aquarium tubing) that has one end fitted into the Florence flask and the other end inserted into a clean, empty test tube that is placed in a beaker containing ice water. Use a Bunsen burner to heat the solution in the flask to boiling and distill it until a few milliliters of liquid, called the *distillate*, are collected in the test tube in the ice bath. Be careful to avoid boiling over the solution into the distillation tube, which would contaminate the final distillate. Heat these few drops of the distillate from the ice bath test tube with a low flame until dry. Record the results. Discard the remaining solution from the Florence flask in the designated waste container.
5. Wash all glassware with soapy water, then rinse with tap water. Return all equipment to their designated areas.

ANALYSIS: Prepare a data table similar to the pre-lab analysis table with procedure number listed in one column, and observations listed in another column.

CONCLUSION:

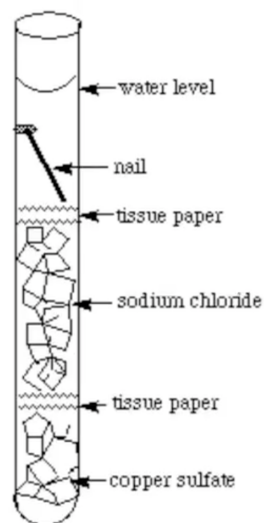
1. List the separation techniques used in this experiment. Which one was most successful?
2. What is the color of the solution formed in step 1 of the procedure?
3. How is the residue in the filter paper different from the original substances?
4. Are there any substances in the filtrate recovered in step 2?
5. List the chemical reactions that occurred in this experiment. (Copy them from the your teacher's notes.)
6. Write a final summary paragraph to describe the changes that occurred in the one-tube experiment. Include evidence that supports this conclusion.

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- (8) Slide the nail into the test tube. Continue adding water until it covers the nail completely.
- (9) Cover the test tube with parafilm and record your observations.

Set-up



Day 1

Record Observations of Changes in Starting Components



Day 2



Day 3



Day 4



Day 6

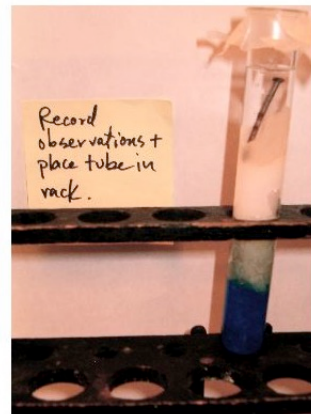
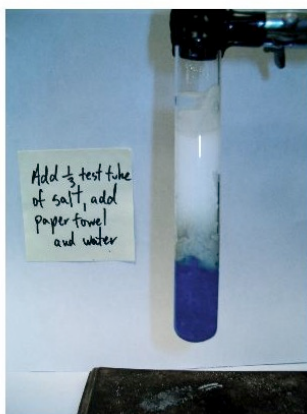
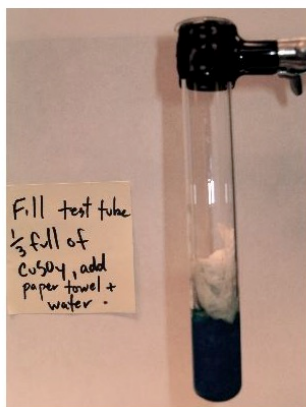


Day 7



1 year later

Cu One-Tube Experiment



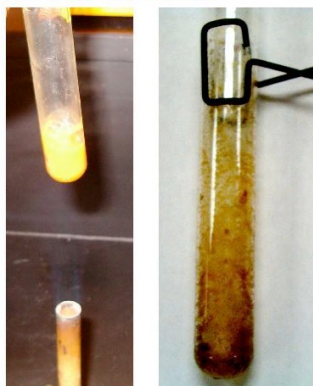
One-Tube Separation Lab Initial Set-up



One-Tube Separation Lab Residue from Filtration



One-Tube Separation Lab Evaporation of Filtrate to dryness



One-Tube Separation Lab

Distillation



One-Tube Separation Lab Distillate



One-Tube Separation Lab Dried Distillate

