Name: _____ Date: _____

Borax Snowflake Ornaments

Introduction

Borax has a wide variety of uses. It is a component of many detergents, cosmetics, and enamel glazes. It is also used as a fire retardant, as an anti-fungal compound for fiberglass, as an insecticide, and as a texturing agent in cooking. Borax is mined in Turkey and also in Death Valley, where over 20 million pounds were hauled out by twenty-mule-teams in just six years in the late 1800's.

In this lab, you will use borax's ability to form a supersaturated solution to create crystalline "snowflake" ornaments. As a hot solution of borax cools, the solute can no longer stay dissolved and will attach to anything it can in order to form solid crystals. We will create snowflake-shaped ornaments using pipe cleaners, which have lots of tiny bristles to which the borax can latch on. This activity will take 2 days.

Materials

acrylic spray
borax
pipe cleaners (12"), 3
plastic cups (16+ oz.), 3
wooden splints, 3

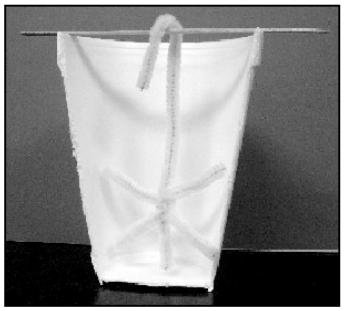
Equipment

beakers, 250-mL & 1-L
beaker tongs
hotplate
measuring cup, 1/3-cup
permanent marker
scissors
stirring rod

Safety Considerations

- Sometimes chemicals from previous labs still remain in glassware and on other lab equipment; wash all lab equipment before and after performing this lab.
- Wash your hands thoroughly after completing this lab.

Procedure – Day 1



1. Add 700 mL of water to a 1-L beaker and heat it on a hotplate at the highest setting.
2. Working in groups of three, obtain the following:
   - three plastic cups
   - three wooden splints
   - three pipe cleaners
   - 2/3 cup of borax in a 250-mL beaker
3. Using a permanent marker, label your cup with your name.
4. If you would like to make a snowflake, complete the following steps; otherwise, make your own design!
   a. Using a pair of scissors, cut your pipe cleaner into fourths (half, then half again).
   b. Twist the sections together to form a six-sided snowflake shape with one long arm. Trim as necessary to get the desired shape.
   c. Make a "hook" on the long arm of your flake. Place this hook on a wooden splint and hang the snowflake in the cup.
5. IMPORTANT: the ornament should hang near the bottom of the cup without touching the

bottom or sides.

6. Once your water is boiling, turn the hotplate off and slowly dissolve the borax into the hot water while stirring.
7. Carefully fill each of the three large plastic cups with about 200 mL of hot borax solution. You may either hold an empty, small beaker with tongs and "ladle" the water out of the large beaker; or you may hold onto the 1-L beaker with beaker tongs and, while it is still resting on the hotplate, tilt it to pour the solution out into the cups.
8. Hang your pipe cleaner ornament in the cup so that the splint rests on top of the cup and the ornament is completely covered with liquid and hangs freely without touching the bottom or sides of the cup.
9. Set your cup aside and allow it to sit undisturbed overnight.

Procedure – Day 2

1. Carefully remove your ornament from the cup and gently shake it dry. Some crystals may have grown between the ornament and the cup, so you may have to use some force to remove it.
2. Once your ornament has been removed from the cup, carefully shake it dry. You may want to pat it with a paper towel or use a hair dryer on a low setting.
3. Apply a light coat of acrylic spray to the ornament to help preserve it and allow it to dry.
4. Enjoy your ornament at home by hanging from a tree or window to catch the lights.

Clean-up

1. Return any unused pipe cleaner segments to their original container.
2. Place used cups and splints in the trash.
3. Dispose of any leftover solutions or solids in the sink.
4. Clean all used lab equipment with soap, water and a test tube brush.
5. Return all equipment to its proper location.
6. Wipe down your lab area and wash your hands before leaving the lab.

Questions

1. After waiting at least one day, what changes, if any, have occurred?

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2. Why do you think it takes so long for the crystallization process to complete?

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3. Name another lab we performed this semester that used a supersaturated solution, and describe one major difference between this lab and that earlier one.

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4. List one way you could change this lab and describe how your results might be different.

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