Borax Crystal Snowflake: Physical Properties and Recrystallization

Background

Crystals are made when a substance has atoms or molecules that form in a very organized, repeating, three-dimensional pattern. Usually when we think of **crystals**, we think of some well-known gemstones like diamonds or rubies, but there are some very common **crystals** too. Sugar, ice, snowflakes, salt...All of these are **crystals**. You can make your own **crystals** grow using borax. Borax is a laundry detergent booster. You can find borax in the laundry room at home or in the laundry detergent section at the grocery store.

You will be making a supersaturated solution. The borax is the SOLUTE in the solution and water is the SOLVENT. In order to make a supersaturated solution, you will heat up water and stir in Borax. The heat and stirring allows more borax to dissolve in the water than would normally dissolve at room temperature. When the supersaturated solution is allowed to sit overnight, the borax will come out of solution and make crystals on the pipe cleaner. This is similar to how rock candy is made and how crystals are formed.

Materials

- Borax (If you cannot find borax, use sugar or table salt.)
- Wide mouth mason jar (pint-size)
- White pipe cleaners
- Pencil
- Boiling water
- Blue food coloring (optional)
- Scissors

Notes for Submission

If you have access to a printer, please print out any sheets on which you write down numbers, observations, calculations, and answers to questions. If you do not have a printer, be prepared to neatly write your data, observations, analysis, and responses to all questions on sheets of paper. Most likely, you will be asked to take photos of your written pages, turn them into a single pdf file, and upload them in Canvas for your instructor to grade. Be sure to follow any specific directions given to you by your instructor.

Pre-Lab Questions

1. Is boiling water a physical or chemical change? Explain your answer with complete sentences.

2. List the pure substances and mixtures in this lab. (Read through the procedure.)

3. How many liquid ounces are in a pint? How many gallons is this? How many milliliters is this? Show your work. Record your answers to the correct number of significant figures.

4. List the postulates of Dalton's atomic theory.

Procedure

NOTE: If you cannot find borax, use sugar or table salt. If you are using a substitute for borax, the crystal growth will take longer. Also, if you are using a substitute, make sure no solids remain on the bottom of the jar. The substance must be completely dissolved.

1. Cut the pipe cleaner into three equal pieces.
2. Twist the sections together at their centers to form a six-sided snowflake shape.
3. Using a length of string that is long enough to do so, tie one end of the string around the pencil and one end of the string to one of the ends of your snowflake.
4. Fill the jar with a pint of boiling water.
5. Record your observations of the dry borax in the Observations section.
6. Add three tablespoons of borax per one cup of boiling water, one tablespoon at a time, until completely dissolved. (If some borax remains undissolved, it is ok.)
7. If you wish, color the water with food coloring.
8. Rest the pencil on the jar, and completely submerge your snowflake in your borax solution. Note the appearance, and make a drawing in the Observations section.
9. Allow your jar to sit undisturbed overnight.
10. After the overnight step, note the appearance of your snowflake, and make a drawing in the Observations section.
11. Once your snowflake is formed, hang it in a window or a place where it can catch the sun.
12. If your instructor asks you to do so, take a photo of your snowflake, and submit it with your materials for this lab.

Observations and Post-Lab Questions

1. Describe what the dry borax looked like before dissolving in the boiling water.

2. In the table below, record your observations of the dissolved borax solution before the overnight step and after the overnight (recrystallization) step. Note the appearance of your snowflake.

Before overnight recrystallization:	After overnight recrystallization:
Description:	Description:
Drawing:	Drawing:

3. Which postulate of Dalton's atomic theory is studied in this lab?

4. What do you see when the crystal snowflake catches the sun? What does it remind you of?