

## Inquiry Question

How can I use chemistry to make crystal snowflakes?

Name: \_\_\_\_\_ Date: \_\_\_\_\_



Crystals are constructed from atoms with a repeating arrangement that is the same throughout the entire crystal structure. There are many different types of crystals, each has its own specific type of atoms and its own specific repeating arrangement. They can have many different shapes and as they form they keep the same structure.

Most crystals are naturally occurring, with many being found in the Earth's crust. We can also use the chemistry of saturated solutions to create our own crystals. A saturated solution is a heated solution that has more of a solid dissolved in it than can normally be dissolved due to its higher temperature. Upon cooling, crystallization occurs as the extra solid comes out of solution.

In this project you will be making real crystal snowflakes that you could use to decorate your home or tree using borax. Borax can be found in the laundry detergent aisle at the grocery store.

This activity takes about 30 minutes of active preparation and then will need overnight to set. Adult supervision is recommended.

### General Instructions

The goal of this project is to see how chemistry can be used to make crystals.

#### Materials you'll need:

- Wide-mouth jar
- 3 pipe cleaners
- String
- Scissors
- Pencil
- Water
- 1-cup measuring cup
- Tablespoon
- Borax
- Food colouring (optional)
- Glow-in-the-dark paint (optional)
- Ribbon (optional)

#### Ideas and Hints:

- Twist the three pipe cleaners together as shown in the picture on the previous page. Tie a piece of string to one end of the star. Connect the string to the next point by twisting it around the pipe cleaner. Continue around until you connect all the points together with the string, making a snowflake skeleton as illustrated.
- Tie another piece of string to one of the pipe cleaner points and tie the other end around the pencil. Place the snowflake skeleton in the jar with the pencil resting across the mouth of the jar. Make sure that the snowflake hangs without touching any part of the jar. Take the snowflake out of the jar.
- Use a kettle or microwave to boil enough water to fill the jar. Have an adult help you add the hot water to the jar. As you do, measure out how many cups of water are needed to fill the jar. For every cup of water placed in the jar, mix in three tablespoons of borax. This will make a saturated borax solution. Stir the borax solution with a spoon until as much of it dissolves as is possible.
- Hang your snowflake in the jar so that it is completely covered in the solution. Let it sit overnight. Gently remove your now crystal-covered snowflake in the morning and let it dry by hanging it in a dry jar.

*Optional: To make coloured snowflakes, use coloured pipe cleaners and add 1-2 drops of food colouring in step four. To make your snowflakes glow in the dark, paint the pipe cleaner snowflake with glow-in-the-dark paint in step two and let it dry completely before going on to step three. Tie a ribbon to one point of your snowflake to make an ornament!*

#### Project submission:

Create a series of diagrams, photos, or videos of the techniques you used to create your snowflakes. If you can drop-in to the school, you can present it to your teacher in-person. Otherwise, upload it to the project submission folder at the end of the unit.