

Inquiry Question

How do you make rock candy?

Name: _____ Date: _____



Have you ever seen sugar crystal candy or rock candy? This candy is made from just sugar and water. How does the sugar turn from grains of sugar, or granulated sugar, into crystals? How long does it take?

In this project, you will learn how long it takes for sugar crystals to form, based on how saturated the sugar/water solution is. You will see how changes in the saturation level affect the rate at which crystals form.

General Instructions

The goal of this project is to learn about crystal formation and how the saturation of the solution affects this.

Materials you'll need:

- 1 cup measuring cup
- 2 cups of water
- 3½ cups of sugar
- 4 - 12 oz drinking glasses
- 4 pencils or coffee stirrers
- 4 - 8 inch lengths of string
- 4 paper clips
- 1 stirring spoon
- 1 tablespoon measuring spoon
- camera (optional)
- tea kettle or large microwaveable bowl
- 4 pieces of masking tape
- stove or microwave to boil water
- the **Making Sugar Crystals Experiment** that follows

Ideas and Hints:

- Complete the following **Making Sugar Crystals Experiment**.

Project submission:

You can either submit photos or a video of your project (along with an explanation and/or steps of construction) or, if you can drop-in to the school, you can present this project to your teacher in-person. Be sure to carefully organize any data collected so that any other student or teacher could reproduce your experiment and achieve the same results.

Making Sugar Crystals

Objective :

To learn how long it takes for sugar crystals to form, based on how saturated the sugar/water solution is. To learn how changes in the saturation level affect the rate at which crystals form.

Materials and Equipment / Ingredients :

- 1 cup measuring cup
- 2 cups of water
- 3½ cups of sugar
- 4 -12 oz drinking glasses
- 4 pencils or coffee stirrers
- 4 - 8 inch lengths of string
- 4 paper clips
- 1 stirring spoon
- 1 tablespoon measuring spoon
- camera (optional)
- tea kettle or large microwaveable bowl
- 4 pieces of masking tape
- stove or microwave to boil water

* These materials are all common household supplies.

Introduction :

Have you ever seen sugar crystal candy? The candy is made from two simple ingredients: sugar and water. How does the sugar turn from grains of sugar (called granulated sugar) into crystals? How long does it take?

Complete this sugar crystal experiment and learn all about it.

In this experiment, sugar and hot water are stirred together to form a solution. By varying the amount of sugar, the solution may become saturated or supersaturated. As the solution cools, crystals may form.



Photo 1: Granulated Sugar



Photo 2: Sugar Crystals

Research Questions :

What is the right proportion of sugar to water? How fast do the sugar crystals form?

Will crystals form faster when the solution is saturated or supersaturated? (See below for the definitions.)

Terms :

Solution: A mixture in which a gas, liquid, or solid is evenly dissolved in a gas, liquid, or solid without any chemical change occurring. In this case, sugar is our solid which is dissolved uniformly in liquid water.

Saturated - where the greatest possible amount of a substance is dissolved in solution. In this case, we create a saturated solution by stirring in the greatest possible amount of sugar that will dissolve in the water, without any visible grains of sugar remaining. The resulting liquid appears to be clear and no more sugar can be dissolved.

Supersaturated – where the amount of a substance has been increased beyond saturation; where more substance has been dissolved than what is possible at room temperature. In this case, we can supersaturate our solution by adding more sugar than can be dissolved in the water and heating it up. The resulting liquid appears cloudy.

Crystal: a solid having a characteristic internal structure where the atoms are arranged in an ordered pattern that is periodic.

Experimental Procedure :

1. Find out the saturation point of sugar in 1 cup of hot water.
 - a. Fill a 12 oz drinking cup with 1 cup of water.
 - b. Microwave the water (or heat it in a kettle) until it starts boiling.
 - c. Add sugar, in one-tablespoon increments, until no more dissolves.
 - d. Record the maximum amount of sugar that could be dissolved.
2. Boil two cups of water.

3. For each piece of string, tie one end of the string to a paper clip and the other end of the string to a stirrer/pencil.
4. Put one of these on top of each of the four cups, with the paperclip dangling into the cup.
5. Label each cup in quarter cup increments, up to 1¼ cups of sugar.
6. Add the designated amount of sugar (determined above) to each cup.
7. Add a ½ cup of boiling water to each cup.
8. Stir until the sugar is dissolved as much as possible.
9. Immediately after dissolving the sugar, take pictures.
10. Record data regularly.
11. At the end of 2 weeks, record your final measurements. Hopefully, you have successfully made rock candy!
12. Clean up by discarding the sugar water and strings and cleaning the glasses.

Bibliography :

1. [How Sugar Cane is Made](#)
2. [The Sugar Process](#)
3. [Sugar Crystal Growing Problems and How To Solve Them](#)