

# Rock Candy Crystals

**Overview:** We can see crystals when we look around in all kinds of places: in the kitchen, in the driveway, and in jewelry, to name a few. Today, we'll explore the nature of crystals and the ways that they can form using some minerals dissolved in solution.

**What to Learn:** In this experiment, we will see crystals form from a liquid solution that has become past the point of saturation by minerals. This mixture, called a supersaturated solution, will form into a crystal when it finds a surface to cling onto, such as a stick or string submerged in the liquid. The object can be "seeded" with some salt or sugar (or whatever substance the solution is saturated with) in order to speed up the process.

## Materials

- pencil or wooden skewer
- string
- glass jar (cleaned out pickle, jam or may jars work great)
- 8 cups of sugar
- 3 cups water
- paper clip
- adult help and a stove
- food coloring (optional but fun!)

## Lab Time

1. If you plan on eating the sugar crystal when you're done, you probably want to boil water with the jar and the paper clip in it to get rid of any nasties. Be careful, and don't touch them while they are hot.
2. Tie one end of the string to the pencil and the opposite end to the paper clip. (You can alternatively use a skewer instead of a piece of string to make it look more like the picture above, but you'll need to figure out a way to suspend the skewer in the jar without touching the sides or bottom of the jar.)
3. Wet the string a bit and roll it in some sugar. This will help give the sugar crystals a place to start.
4. Place the pencil across the top of the jar. Make sure the clip is at the bottom of the jar and that the string hangs straight down into the jar. Try not to let the string touch the side of the jar.
5. Heat 3 cups of water to a boil (use adult supervision).
6. Dissolve 8 cups of sugar in the boiling water (again be careful!). Stir as you add. You should be able to get all the sugar to dissolve. You can add more sugar until you start to see undissolved bits at the bottom of the pan. If this happens, just add a bit of water until they disappear.
7. Feel free to add some food coloring to the water.
8. Pour the sugar water into the jar. Put the whole thing aside in a quiet place for 2 days to a week. You may want to cover the jar with a paper towel to keep dust from getting in.
9. You should see crystals start to grow in about 2 days. They should get bigger and bigger over the few days. Once you're happy with how big your crystals get, you can eat them! They're nothing but sugar! (Be sure to brush your teeth!) This one (left) is about 6 months old. There you go! Next time you hold a pencil, throw a ball, or put on a shoe try to keep in mind that what you're doing is using an object that is made of tiny strange atoms all held tightly together by their bonds.

## Rock Candy Crystals Data Table

Time	Est. Number of Crystals	Drawing
1 day		
5 days		
2 weeks		

### Reading

Crystals are solid groups of molecules in a rigid, repeating pattern. They are the basic building blocks of minerals, which are in turn the basic building blocks of rocks. Scientists classify crystals both on their chemical makeup (which determines what minerals they will form) as well as the physical structure. Their symmetry, or how the planes of the crystal are arranged, take on fanciful names like *orthohombric* and can help us learn more about the crystal itself.

Today we'll learn about crystal formation and simultaneously make some sweet rock candy. We'll use a few ingredients that you probably have in your house. All we need is water, heat, sugar, and a place for our crystals to grow. We need a glass container, so we have some (jars of jam, mayo, etc.) to use to help our crystals and candy form. We need an 8/3 ratio for our solution – 8 cups of sugar for every 3 cups of water.

Crystals form like this from dissolved minerals in places underground. Sometimes these crystals reach epic proportions. There is one cave in Mexico with crystals more than 40 feet long! What happens is that the molecules of these minerals bond with other minerals and form out of a liquid solution. A crystal is basically a really big collection of molecules that keep repeating over and over in some type of pattern. (Draw a picture on the board to help). These crystals are made up of a few elements. For example, a calcite crystal is formed of calcium, carbon and oxygen. The specific mineral calcite is formed of the molecule calcium carbonate. Sugar is a more complex type of crystal. The difference between the calcite crystal and the sugar crystal is that calcite is a basic building block for many types of rocks. Calcite is a mineral.

## Exercises

1. Draw a picture of a crystal, showing the individual molecules:
2. What do crystals form?
  - a. Rock candy
  - b. Minerals
  - c. Rocks
  - d. Caves
3. What do minerals form into?
  - a. Rock candy
  - b. Sugar
  - c. Salt
  - d. Rocks
4. What is it called when there is more sugar than water in the mixture of our solution?
  - a. Saturated
  - b. Solution
  - c. Soluble
  - d. Supersaturated

**Answers to Exercises: Rock Candy Crystals**

1. Draw a picture of a crystal, showing the individual molecules (should show some geometric pattern)
2. What do crystals form? (minerals)
3. What do minerals form into? (rocks)
4. What is it called when there is more sugar than water in the mixture of our solution? (supersaturated)