

ROCK CANDY – CRYSTAL GROWING LAB

Abstract

Here is a riddle for you: what kind of rock grows? The answer is: rock candy! This delicious candy is actually crystallized sugar and you can "grow" it from a sugar-water solution. In this science fair project you'll learn how to grow your very own rock candy and determine if using seed crystals changes the growth rate of your sugar crystals.

Introduction

Have you ever looked at rock candy and wondered how it's made? Rock candy is actually a collection of large sugar crystals that are "grown" from a sugar-water solution. Sugar, like many other materials, can come in many different physical states. As a solid it can either be **amorphous**, without shape, like when it forms cotton candy, or **crystalline**, with a highly ordered structure and shape, like when it forms rock candy crystals.

Crystals form when the smallest particles of a substance, the **molecules**, arrange themselves in an orderly and repetitive pattern. Molecules are too small for us to see moving around and arranging themselves, but you can get a rough idea of what this would look like by taking a small shallow tray and filling it with marbles, ball bearings, or other spheres. As you add more spheres, the bottom of the tray becomes covered, then the spheres must form layers on top of one another, and a structure or pattern emerges.

So how do the molecules of a substance get together to form a crystal? First there have to be enough molecules in one area that they have a high chance of bumping into one another. This happens when a **solution**, which is made up of a liquid and the **compound** that will be crystallized, is saturated. In the rock candy, the liquid is water and the compound is sugar. A solution is **saturated** when the liquid holds as much of the compound dissolved in it as possible. For example, when making rock candy, you dissolve as much sugar as possible in water to make a saturated solution. If you add more compound than can dissolve in the liquid, the undissolved bits remain as solids in the liquid. In a saturated solution, the molecules bump into one another frequently because there are so many of them. Occasionally when they bump into each other, the molecules end up sticking together; this is the beginning of the crystallization process and is called **nucleation**. Once several molecules are already stuck together, they actively attract other molecules to join them. This slow process is how the crystal "grows."

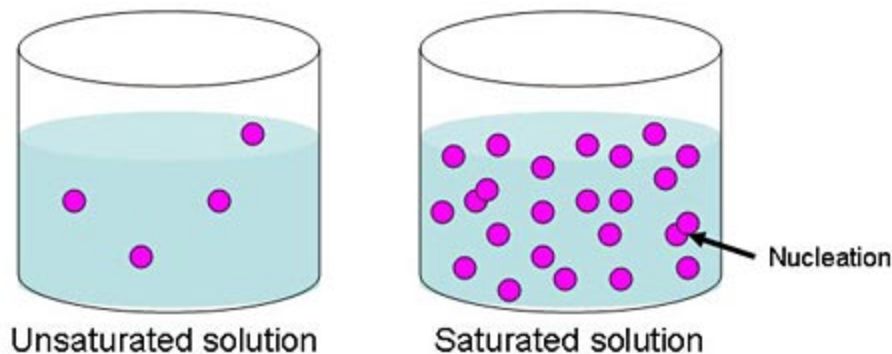


Figure 1. This diagram illustrates the large number of molecules in a saturated solution. With so many molecules in the liquid, there is a high chance of them bumping into one another and creating a nucleation event.

Terms, Concepts, and Questions to Start Background Research

Define each of the following words.

- Amorphous solid
- Crystalline solid (also known as crystal)
- Molecule
- Solution
- Compound
- Saturated
- Nucleation
- Seed crystal

Questions

- How do you make a saturated solution?

- Which holds more sugar: cold water or hot water?

- How do crystals grow?

- What is nucleation?