

Rock Candy (Crystallized Sugar)

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Materials Needed

Sugar (up to 4 cups)
Water (1 cup)
flavoring (concentrated candy flavoring preferred, but flavoring extracts, available in the supermarket can be used)
food color (concentrated candy food colors preferred, but standard food colors, available in the supermarket can be used)
stirrer: wood spoon or high temperature plastic candy spoon
string and/or wood skewers (sharp tip of wood skewer removed)
saucepan
hot plate or kitchen stove
glass jar
funnel
cardboard squares to cover glass jars
measuring cups: 1 cup liquid and 1 cup powder
pot holders or hot mitt

Safety

Safety glasses or goggles must be worn in the laboratory at all times.

This experiment is best performed at home or in a home economics laboratory. If this experiment is performed in a chemistry laboratory, all work surfaces must be cleaned and free from laboratory chemicals. After cleaning work surfaces, it is advised to cover all work areas with aluminum foil or a food-grade paper covering.

All glassware and apparatus must be clean and free from laboratory chemicals. Use only special glassware and equipment, stored away from all sources of laboratory chemical contamination, and reserved only for food experiments is recommended.

There are no safety hazards associated with the materials used in this experiment.

The solutions prepared in this experiment will be hot. Wear a hot mitt or use pot holders when handling hot solutions or jars of the hot liquid.

Disposal

Generally, all waste materials in this experiment can be disposed in the trash or poured down the drain with running water. All disposal must conform to local regulations.

Procedure

The initial ratio of sugar to water is 2 cups sugar to one cup of water. Additional sugar will be needed.

Measure 1 cup water into a saucepan. Add 2 cups sugar.

Heat, with stirring until the sugar is dissolved.

Add additional sugar:

One additional cup of sugar (three cups of sugar total) will produce a solution that will crystallize within one to three days.

Two additional cups of sugar (four cups of sugar total) will produce a solution that will crystallize within one day.

Maintain low or medium heat, stirring constantly, until the sugar dissolves. If the solution boils, maintain a low or soft boil. Do not allow a rapid boil as the mixture will foam and may overrun the sides of the saucepan.

Turn off the heat. If food color and/or food flavor is being used, add it at this time. Use only a few drops of color and/or flavor.

Stir well.

Dip the string or wood skewer into the hot solution. Set them aside to cool and harden. (Use wax paper or parchment paper for the string or skewers.) Sprinkle a small amount of sugar on the string or wood skewer. This sugar will be the seed crystals for the rock candy to form.

Using a funnel, pour the solution into glass jars and allow it to cool to room temperature.

Place the string or wood skewer into the cool solution. Do not allow them to touch the bottom of the jar.

Depending on the concentration of the solution, sugar crystals will grow on the string or wood skewer. Crystallization can continue for a week or more.



Figure 1. A wood skewer with sugar crystals on it

Explanation

Sugar is extremely soluble in water. Two cups of sugar, approximately 400 g, can be dissolved in 250 g of water to form a stable syrup that may not crystallize for several weeks. The addition of more sugar produces a highly saturated solution that will crystallize within a few hours (4 cups of sugar per cup of water) to several days (3 cups of sugar per cup of water). Slower crystallization is preferred to produce the nicest formed crystals.

It is common for sugar crystals to grow on the bottom and sides of the jar.

Crystal growing is an art. The best formed crystals grow slowly. For this experiment, the best results, in a reasonable amount of time, were obtained using a total of 3 cups of sugar dissolved in one cup of water. It took over 3 weeks to get crystals in a solution using 2 ½ cups sugar in one cup of water. Using a total of 4 cups of sugar in one cup of water, crystals were formed in several hours, with additional crystals on the sides and the bottom



Figure 2. Sugar solution with a prepared string in it.



Figure 3. Rock candy (sugar crystals) grown on wood skewer and on string.



of the container. This solution still needed several days to produce a reasonable amount of crystals on the wood skewer.

If crystals do not form within a reasonable amount of time (up to one week), do not discard the solution, it can be reused. Add $\frac{1}{4}$ to $\frac{1}{2}$ cup of sugar and reheat the solution. Pour that solution into a clean jar and repeat the procedure.

References

Gehring, Abigail R., *Classic Candy*, Skyhorse Publishing, New York, NY, 2013.