

Crystals

Overview

This activity explores the characteristics and properties of crystals. Many of your students may already be familiar with crystals in the form of diamonds, gems, sugar and salt crystals. For example, rock candy is just a large crystal of sugar and rock salt is just a large version of table salt.

This activity will explore three interesting properties of water soluble crystals. First, all of the crystals of a substance are almost exactly the same shape regardless of their size! Second, crystals dissolve into solution and can be re-grown back into crystals which closely resemble the original crystals. The third phenomenon is that crystals of different substances dissolve in differing amounts.

Objectives

- Draw and describe the general shape of common crystals
- Given three substances, separate cups and equal amounts of water, determine which substances dissolve the most
- Compare and contrast the crystals which result from evaporation to the crystal of the original starting material
- Apply the concepts from this activity in the solving a problem of identification

Materials

Table Salt	Black construction paper	Masking
Epsom salt	Three cotton swabs	Sugar
Three clear plastic cups	Warm tap water	Tape

Pre-lesson Discussion Topics

- Rock candy is a good example of a crystal.
- Police often use crystal shapes as one of the methods for identifying illegal drugs.
- The crystal gardens that can be grown by students are a good example of crystals.
- Almost all precious gems are crystals.
- A snow flake is a crystal of water.

Part I -- The shape of crystals

1. Using your scissors, cut the construction paper into three equal sections. Using the masking tape, label the top section *Table Salt*, the middle section *Sugar* and the bottom section *Epsom Salt*.
2. Place a few (not more than 10) crystals of *Table Salt*, *Sugar* and *Epsom Salt* in their labeled areas on the construction paper.

Look carefully at the crystals and draw what you see in the spaces below:
Draw the crystals

<i>Table Salt</i>	<i>Sugar</i>	<i>Epsom Salt</i>

Part II -- Dissolving of different solids

1. Take three plastic cups and label them *Table Salt*, *Sugar* and *Epsom Salt*.
2. Put about 1/4 cup or less of hot tap water into each cup.
3. Place a level teaspoon of *Table Salt* in the cup labeled *Table Salt* and stir until the salt disappears.
4. Add another spoonful and stir. Repeat this until no more salt will dissolve, while keeping track of the number of teaspoons you used. Write your results in the table below.
5. Repeat this procedure for the *Sugar* and *Epsom Salt*.

<i>Table Salt</i> Number of teaspoons needed:
<i>Sugar</i> Number of teaspoons needed:
<i>Epsom Salt</i> Number of teaspoons needed:

Part III -- Recovery of crystals from solutions

1. Dip a cotton swab in the *Table Salt* cup and draw a letter on the *Table Salt* construction paper.
2. Do the same for the other two solutions using new cotton swabs.

- Allow the water to evaporate and examine the crystals. Draw the crystals in the boxes below.
- Draw the crystals on the paper after drying

<i>Table Salt</i>	<i>Sugar</i>	<i>Epsom Salt</i>

Summary Questions

What are the differences among the shapes of the three crystals you looked at in Part I?

Which substance dissolved the fastest? _____ The slowest?

Compare the crystals you observed in Part I with the crystals in Part III. What are the similarities between the two?

Part III>	<i>Table Salt</i>	<i>Sugar</i>	<i>Epsom Salt</i>
Part I			
<i>Table Salt</i>			
<i>Sugar</i>			
<i>Epsom Salt</i>			

Get with your assigned partner and discuss how you could identify a unknown crystal based on your observations from this activity. Write down your and your partners solution below:

Application

Pretend you and your partner are crime fighters and are called to the scene of a murder. The clothes of the victim have traces of a powder. After asking a lot of questions, the two of you determine only 3 people could be have committed the murder and no one is confessing. As luck would have it, all three suspects have white powders in their pockets. Using the concepts we learned in this activity, explain how you and your partner could determine which suspect is the murderer.
