

## Making Stalactites and Stalagmites from Epsom Salt

Grades K – 12

### Introduction

Rock formations called **stalactites** result when **hard water** drips from the ceiling of a cave. Hard water contains a lot of **calcium and/or magnesium** that the water picks up as it flows over or through limestone, or some other rock that has a lot of calcium or magnesium. As the water evaporates, the calcium carbonate reforms into a solid. If the water drips slowly, a **stalactite** can form (hanging from the roof of the cave) and a stalagmite can form (“growing” upward from the floor of the cave). With the help of an adult partner, let’s see if you can make some stalactites and stalagmites in your kitchen using Epsom salt (magnesium sulfate, or  $MgSO_4$ ).

### Safety Suggestions

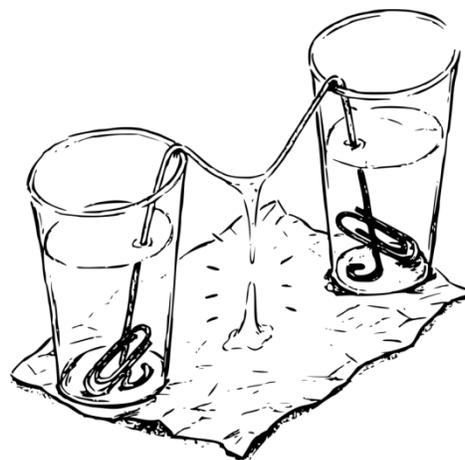
- Wear safety goggles or glasses when heating the water and making the Epsom salt solution.
- Wear protective clothing or an apron to protect clothing during this experiment.
- Caution: hot liquids! Use a pot holder or insulated oven mitt when handling the hot water and solution.
- Do not eat or drink any of the materials used in this activity.
- Thoroughly wash hands after this activity.
- Have a parent or an adult assist.
- Epsom salt may irritate the eyes. If swallowed, Epsom salt may cause nausea, vomiting, or diarrhea.
- Dispose of any leftover solid Epsom salt in the trash, and pour any leftover Epsom salt solution down the drain with running water.

### Materials

- 2/3 cup (about 160 mL) Epsom salt (available in a drug store or in the pharmacy section of a supermarket)
- 1 cup (250 mL) water
- 1 sheet of aluminum foil, about 12 inches in length
- 1 teaspoon
- 1 small cooking pot or ceramic bowl
- 2 small (12 ounce or about 355 mL) jars or glasses
- 1 unwaxed cotton string, about 12 inches in length
- 2 large paper clips

### Procedure

1. Spread out a 12-inch (about 30 cm) long piece of aluminum foil on your work surface. Choose a work area where your experiment will not be disturbed by people or pets overnight.
2. With an adult’s help, heat 1 cup of water to a boil in a small cooking pot on the stove or in a small ceramic bowl in the microwave. Be careful: water may superheat and splash when heated in a microwave. Heat the water 30 seconds at a time, and stir with a spoon after each heating.
3. Measure 2/3 cup of Epsom salt into the hot water. Stir the mixture with a spoon until the Epsom salt dissolves ... now you have an Epsom salt solution! Use your oven mitt when handling the container with the hot water. *Be careful not to burn yourself.*
4. Divide the Epsom salt solution into two small (12 ounce) glasses or jars.
5. Place the glasses of solution on top of your aluminum foil. Tie a large paper clip onto each end of a 12-inch piece of unwaxed cotton string. Wet the string completely by dipping it into the Epsom salt solution and letting it remain there for 5 minutes. Then put one of the paper clips into the solution in both glasses.



- Move the glasses so that the wet string droops between them. The lowest part of the string should be at least 2-3 inches above the aluminum foil. *Wash your hands after handling the string.*
6. Make observations starting 30 minutes after you set up your experiment. Record what you see. Leave your set-up overnight and look at the results in the morning.

#### **How does it work? Where's the chemistry?**

The solution you made is **supersaturated**, which means that there is more magnesium sulfate dissolved in the solution than should be possible at room temperature. How can that be?

Remember that we used *hot water* for this experiment? By using hot water instead of cold water, we were able to dissolve more magnesium sulfate than we could normally. As the solution drips from the string, the water evaporates and the magnesium sulfate that's left over turns solid, creating a stalactite and stalagmite. As the magnesium sulfate crystallizes, we see the results of the evaporation process.

#### **References**

- <https://communities.acs.org/docs/DOC-56376>