



GirlsGotSTEAM One-Day Workshop: [Growing Bacteria]

Program:	Cooling Crystals
Age Range:	6-9
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Description:	Investigate how to form different kinds of crystals with simple chemicals! Discover how a simple base of saltwater can be heated to form the perfect starting point for a wide variety of crystals.

NOTE TO INSTRUCTOR: This lesson plan is an OUTLINE - use it as you will to execute your one day workshop. Feel free to add and remove material as needed. Attached is a PowerPoint and a packet (SciNotebook) for your student to complete. The SciNotebook includes material that should be taught and explained throughout the day.

The PowerPoint will include pictures, additional information, and instructions. It **SHOULD NOT** be the primary resource to run the workshop. Please refer to the lesson plans for detailed instructions. If you have any questions, comments, or concerns about any information in this workshop, please email info@girlsgotsteam.org

Time	Objective	Component
Block 1: Introduction	Students will receive a short lesson on crystal formation as well as examples of similar labs using SciNotebook and Powerpoint	Activity 1: Powerpoint Lesson Activity 2: Crystal Examples + Discussion Activity 3: Interactive Questions (from PowerPoint) Activity 4: SciNotebook Activity
Block 2: Grouping and Instruction	Teacher will create a saltwater base in front of the classroom, and group all students into groups. The teacher will then distribute materials accordingly.	Activity 1: Teacher Creates Saltwater Base Activity 2: Students Split Into Groups Activity 3: Directions (via Powerpoint)
Block 3: Procedure	Students may now follow the procedure & begin! After this, the teacher will place crystals in a secure location to harden. Students will then observe results	Activity 1: Start Procedure Activity 2: Observe Results Activity 3: Discussion & SciNotebook



Block 4: Reflection	Students analyze their crystal shape, and refer to powerpoint. Teachers will go over key concepts, and conclude with SciNotebook.	Activity 1: Crystal Analysis Activity 2: SciNotebook
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NOTE TO INSTRUCTOR: The materials listed below are suggestions. Once again, feel free to remove or add materials as needed.

Group Materials:

250-mL Beaker or 9-oz Plastic Cup (for each group) • Coffee Stirrer or Pencil (for each group) • Hand Lens (for each group) • Lab Marker (for each group) • Piece of Nylon or String (15 to 20 cm for each group) • Small Piece of Masking Tape (for each group)

Teacher Materials:

Rubber Gloves • Safety Goggles • Salt (at least 100 mL) • Magnesium Sulfate Heptahydrate (Epsom Salt; 100 mL) • Potassium Sodium Tartrate Tetrahydrate (Rochelle Salt; 100 mL) • Water • 500-mL Beaker • Hot Plate • Lab Apron • Pair of Forceps • Shallow Container (can be tupperware or petri dish)

Block 1: Introduction

• Activity 1:

- Using the Powerpoint, go over the definition of a crystal and how they form.
 - Crystals: a solid figure made up of a repeating pattern of geometric shapes.
 - **Crystals** form when a liquid cools and hardens. During this crystallization process, molecules within the liquid pull together in a pattern. **Explain that this is going to be the phenomenon employed in the lab.*

• Activity 2:

- Give examples from PowerPoint (i.e. emerald, amethyst, sugar, quartz, diamonds), and have students pick their favorite.
 - This draws students in and makes them think about what other compounds could be crystals. Make sure to be engaging! There should be active discussion occurring.

• Activity 3:

- Using the powerpoint, lead the class in a series of interactive questions. Get them thinking about how THEY can form crystals.
 - Again, stay engaged with your students. Allow them to participate in small-group discussion. They should be thinking about where this lab will be taking them.

• Activity 4:

- Direct students to fill out the SciNotebook questions before moving on.
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Block 2: Grouping and Instruction

• Activity 1:

- The teacher will prepare the saltwater base (THIS CAN BE DONE BEFORE INTRODUCTION IF TIME IS LIMITED)
 - Teacher puts on appropriate lab safety gear (goggles, apron, etc).
 - Add 300 mL-350mL of water to the 500-mL beaker.
 - Place the beaker on the hotplate. Adjust the heat to medium and heat the water until it is very hot, but do not let it boil.
 - Gradually add salt to the beaker and stir to ensure it all dissolves in the water. Add 100 mL salt to the water or as much as will go into solution.
 - Use the forceps to remove the beaker from the hotplate, and then pour a small amount of saltwater solution into your preferred shallow container. Allow the solution to sit undisturbed for about one hour. Small salt crystals will form in the container. These small crystals will be used as the "seed" crystals for each group.

* **REPEAT THESE STEPS** for both Epsom Salt and Rochelle Salt.

• Activity 2:

- Teachers will divide the class into groups of 4 (groupings are dependent on size and availability of materials. GirlsGotSTEAM recommends 4).
 - Make sure each group has the following materials: a 250-mL beaker or 9-oz plastic cup, a coffee stirrer or pencil, a piece of nylon or cotton string 15 to 20 cm long, and a hand lens.
 - Have each group pick their starting "seed". (Salt, Epsom Salt, Rochelle Salt).
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Block 3: Procedure + Observations & Discussion

• Activity 1:

- Obtain a "seed" crystal from your instructor and tie it to one end of the piece of string.
- Tie the other end of the string to the coffee stirrer or pencil.
- Label the beaker or cup with your group's name using the piece of masking tape and lab marker.
- Place the end of the string with the seed crystal into the salt solution and lay the coffee stirrer or pencil across the mouth of the beaker or cup.
 - NOTE: You can make shapes by inserting a small piece of wire, and winding the string around it.
- Place your group's beaker or cup in a place designated by your instructor. Allow it to sit undisturbed for at least 24 hours.
- After the 24 hours have passed, remove the string from the solution.

• Activity 2:



- Observe the results through the hand lense. Have students use the free space in the SciNotebook to draw the patterns. If crayons/markers are available, have them color it in!

• **Activity 3:**

- Answer the questions presented in the SciNotebook

Block 4: Reflection

• **Activity 1:**

- Have students compare their drawings to the drawings of real crystal structures in the Powerpoint. To start their discussion, you can lead with:
 - Why do you think each crystal has different formations up close?
 - From our introduction, why do crystals form differently based on the liquid they start with?

Activity 2:

- As the lab is now coming to a close, please have students fill out the Reflection remarks in their SciNotebook.
- Check all SciNotebooks for completion.

We hope your students will enjoy creating their own Brain Models! Thank you so much for using

GirlsGotSTEAM's resources for your workshop - our team would be beyond happy to provide you with more free and enjoyable lesson plans in the future! For any questions, comments or concerns, please email girlsgotsteamorl@gmail.com or DM us @girlsgotsteam on Instagram!