# Science for Citizens 11 Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 Partner: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

# Lab: Creating Crystals

**Introduction:**

Minerals in nature form from **crystallization.**

Crystals form in two main ways: When a liquid solution containing dissolved solids starts to cool and the water evaporates, leaving behind the solids. Certain molecules in the liquid gather together as they attempt to become stable. They do this in a uniform and repeating pattern that forms the crystal.

In nature we see crystal formation from solutions such as Salt Flats, stalactites, geodes, and veins in rocks.

Crystals can also form when liquid molten rock (**magma**) cools and hardens in lava flows.

The speed at which crystals form depends upon the ***amount*** and ***type***of elements in solution and the ***rate of cooling*.** The longer the cooling time, the more time crystals have to grow, and crystals will be bigger. Short, quick cooling times will produce smaller crystals. It has been estimated that garnets grow about one atomic layer per year (a two centimeter crystal growing over a period of ten million years ). In mines, crystals can grow extremely fast (6-8 weeks). Halite and Gypsum are two sedimentary rocks that form by evaporation.

Crystals can have very flat surfaces called facets. The shapes depend on the type of elements present in solution. Crystals formed by the same elements and method should have similar shapes.

**Crystal Lab**  Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 Partner: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Purpose:**  To investigate how crystals form from liquids.

**Materials** Glass marking pencil Dental Floss

 1 Petri dish per sample 100 mL beaker

 Stirring rod Hot plate

##  Various chemical solids.

##

# Procedure

1. Label a Petri dish with your assigned solid using the grease marking pencil.
2. Take a 100mlL beaker and add 25mL water. Heat to boiling.
3. Dissolve your assigned solid until the solution is saturated (some no longer dissolves).
4. Using beaker tongs pour the hot solution into your labelled Petri dish. Let cool.
5. Place a piece of dental floss into the solution and let it dangle over the edge. As water evaporates from the string, small crystals of sugar will encrust the string. These tiny seed crystals provide starting points for larger crystals. Future growth will be concentrated around these points.
6. Let the solutions to evaporate slowly for a day or two. Note which crystals form quickly and which form slowly.

**Observations:**

* In the chart below, draw the shape and colour of the crystals you see. Use a magnifying glass.
* Describe the shape in a few words. Note any irregularities such as crystal that have grown into each other, crystal overlapping.
* Any perfectly formed crystals?

|  |  |  |
| --- | --- | --- |
| Sodium tetraborate (Borax) | Calcium Chloride | Copper (II) sulfate |
| Copper (II) chloride | Sodium bicarbonate (baking soda) | Sodium nitrate |
| Alum (potassium ammonium sulfate) | Sodium chloride (salt) | Potassium permanganate |
| Sugar | Ferric ammonium sulfate (iron alum)  | Magnesium sulfate |

**Questions**

1. Why was the solution heated?
2. What are the two main ways crystals form?
3. What is the purpose of the dental floss?
4. What is the relationship between cooling time and size of crystals?
5. How do you think crystal formation would be different if your solution was filtered and then covered?
6. Where do crystals form in nature?
7. Google and name 3 rocks that form by evaporation of water.

Alt:



1. Challenge: Igneous rocks form from molten rock. How does this simulate how igneous rocks are formed in nature?

How is it different?

1. Name a rock that is formed by cooling of magma.