**ACTIVITY: Growing crystals**

**Activity idea**

In this activity, students grow crystals, learn that they are formed when solutions cool and study their characteristics (regular shape and shiny).

By the end of this activity, students should be able to:

* recognise that crystals have a regular shape and are shiny
* recognise the presence of crystals in igneous rocks
* provide conditions for growing crystals.

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**Introduction/background**

Crystals are found in igneous rocks. This activity draws a long bow between the formation of crystals in solution to the formation of crystals in cooling magma. However, the activity will provide a model of crystal formation that has some resonance with the process that occurs during igneous rock formation.

Igneous rocks form when magma cools very slowly underground, allowing crystals to form, typically with a regular shape. The cooling process means also that crystals are formed and laid down in a regular manner. Consequently, once crystals start to form, the particles (ions) in solution are attracted to the crystals that have already been formed.

***Conditions for growing crystals***

Students will need to understand dissolving and that it is temperature dependent. Hot solvents are better at dissolving the material (solute) to be dissolved. This activity relies on evaporation rather than just cooling within the magma.

**What you need**

* Jam jars
* Measuring jug
* Hot water (electric kettle)
* Ice cream sticks
* String
* Washing soda (produces large crystals) or salt
* Copies of [Growing crystals – student worksheet](#worksheet)

**What to do**

1. Hand out copies of the Growing crystals – student worksheet and discuss with the students.
2. Assist students to set up and monitor the experiment.

**Discussion questions**

* Why did you use hot water?
* How do you know when no more solid will dissolve?
* Why do you hang string into the solution? (Easier to grow them on a substrate.)
* How could you make the crystals form more quickly?
* What shape are your crystals? (An important concept is that crystals have a regular shape.)
* Compare your crystals with those you can see in an igneous rock. What things are the same? What things are different?

**Extension activities**

***Growing large single crystals to observe their regular shape***

You may want to repeat this experiment and try to grow a very large single crystal with a regular shape. Filter your super saturated solution, leave it for 2–3 days in the sun and then filter again. There should be some crystals. If not, use a small crystal from your original material. Tie this crystal on the end of your string and hang this in the saturated solution.

***Observing the properties of each crystal type***

Observe the following crystals under a hand lens: copper sulphate, sodium thiosulphate – hypo, crystals in jewellery. What features do crystals have in common? What differences do you see between these different crystals.

**Growing crystals – student worksheet**

Volcanic rocks often contain crystals. Sometimes they are quite hard to see as they may be tiny (visible only through a microscope), but crystals are an important part of the structure that makes up volcanic rocks. Crystals are easily recognised because they are shiny and they have straight sides. Crystals are formed when magma that contains minerals dissolved in it cools under the ground. Sometimes crystals are formed when the rocks are put under huge pressure.

Today, you are going to grow some crystals. The chemicals you are using are already made up of crystals but we are going to try to grow bigger ones.

**What you will need**

* Measuring jug
* Jam jar
* Salt or washing soda
* Spoon
* String
* Ice cream stick
* Hot water (your teacher will provide this)

**What to do**

1. Carefully measure 40ml of hot water into a jam jar.
2. Add your material (salt/washing soda) to the hot liquid and stir until it is dissolved.

1. Keep adding the material until some is left in the bottom of your jam jar no matter how much you stir.
2. Wrap your string round the ice cream stick and dangle it in the solution
3. Leave your jam jar in a sunny place that is safe from animals trying to drink it or people who are likely to tip it over.
4. Make careful drawings or take photos every few days to record how your crystals are growing.