

Crystal size and cooling rate: fast and slow cooling of lead iodide

Igneous rock is rock that forms when molten **magma** or **lava** cools. It often contains crystals. The size of these crystals is related to the rate of cooling of the molten rock. This activity actually investigates the formation of crystals from a saturated solution rather than from a melt, although the principles are the same.

What you will need

Apparatus

- eye protection
- 2 boiling tubes
- boiling-tube rack
- Bunsen burner
- heatproof mat
- boiling-tube holder
- spatula
- thermometer (0-100 °C)

Chemicals

- a spatula measure of lead iodide (harmful by ingestion and inhalation of dust)
- samples of granite and of rhyolite (or photographs if samples are not available)

Safety notes

- Wear eye protection.
- Lead iodide is harmful.

What to do

Look at samples (or photographs, if samples are not available) of the following two types of rock – **granite** and **rhyolite**. Both these types of rock are **igneous**, that is they formed from molten rock as it cooled down. What do you notice about the sizes of the crystals in these two types of rock?

Half fill a boiling-tube with water. Add a small spatula measure of lead iodide. Heat over a Bunsen flame until the mixture starts to boil, taking care, as the mixture can 'bump' very easily, spraying hot liquid out of the tube. Continue to boil for a further minute, then quickly tip half of the contents into another clean boiling tube. Cool this second tube and contents immediately under a stream of cold water from the tap. Place the original tube in a rack to cool down slowly.

Leave both boiling tubes and contents for about 15 minutes until both tubes are at about the same temperature. Look carefully the contents.

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| <p>Q 1. Which type of rock, granite or rhyolite, has the larger crystals?</p> <p>Q 2. What do you notice about the sizes of the lead iodide crystals that form in the two tubes?</p> |
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Q 3. Which tube cooled faster?

Q 4. Use the information to predict which of granite and rhyolite cooled faster as it formed.

Q 5. Molten rock can cool slower in some places than others. Suggest why.