

## Igneous Rocks cont.

- Investigate how speed of cooling affects the crystal size of minerals.
- Link the properties of igneous rocks with where they cooled.
- Use particle diagrams to explain the difference between intrusive and extrusive

Lesson 6

## Making Crystals

Starter: Look at this website  
[www.geology.com](http://www.geology.com)

We will be using it a lot during the next few lessons

### What are Igneous Rocks?

Igneous rocks are formed from the solidification of molten rock material.

There are two basic types.

**Intrusive igneous rocks** crystallize below Earth's surface and the slow cooling that occurs there allows large crystals to form.

An example of an intrusive igneous rocks is **granite**.

**Extrusive igneous rocks** erupt onto the surface where they cool quickly to form small crystals. Some cool so quickly that they form an amorphous glass (**obsidian**), or trap air inside (**pumice**).

An example of an extrusive igneous rock is **basalt**.

### REMINDER

## Making Crystals

In this investigation we will be looking at the affect **the speed of cooling** has on **the size of the crystals made**.

Write a hypothesis for this experiment, using the mark scheme below:

### Hypothesis

**H1 State a reasonable hypothesis (prediction).**

**H2 Explain hypothesis (prediction) using accurate science.**

## Making Crystals

A good hypothesis includes both the dependent and independent variable.

**I think that when we increase the speed of cooling the size of the crystals made will be smaller. H1**

**This is because extrusive igneous rocks which cool quickly only have time to form small crystals or no crystals at all, whereas intrusive igneous rock cool slowly and produce rocks with large crystals. H2**

## Equipment

Each student or group will need

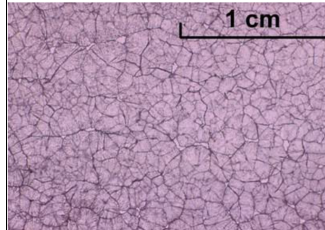
- x eye protection
- x 2 boiling-tubes
- x boiling-tube rack
- x Bunsen burner
- x heatproof mat
- x boiling-tube holder
- x spatula
- x thermometer (0-100 °C)
- x a spatula measure of lead iodide (harmful by ingestion and inhalation of dust)

## Method

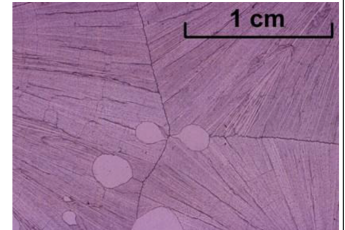
1. Half fill a boiling-tube with water.
2. Add a small spatula measure of lead iodide.
3. Heat over a Bunsen flame, until the liquid starts to boil, taking care as the mixture can 'bump' very easily, spraying hot liquid out of the tube.
4. Continue to boil for a further minute, then quickly tip half of the contents into another clean boiling-tube.
5. Cool this second tube and contents immediately under a stream of cold water from the tap.
6. Leave the original tube to cool down slowly.
7. Leave both boiling-tubes and contents for about 15 minutes, then inspect the contents.

## Results

Draw what you see when looking at both set of crystals. These are the results of the salol experiment.



Small crystals of salol formed by rapid cooling



Large crystals of salol formed by slow cooling

## Making Crystals

Now we have our results we can carry out analysis. Write an analysis for this experiment, using the mark scheme below:

### Analysis

**A1** You have stated whether your results supports your prediction of not.

**A2** You have used two points of data (numbers) to describe how your results supports your prediction or not.

**A3** You have referred to overall trend in your graph, and whether this supports or not your prediction.

## Making Crystals

A good analysis backs up a conclusion with data from the results.

**Our results supported our hypothesis. A1**

**I can see this because our crystals that formed on the cold slide, which cooled quickly were 1-2mm across, whereas the crystals that formed on the warm slide and cooled slowly were 10-20mm across. A2**

**The overall trend is that the quicker the solution cools the smaller the crystals that are made. A3**

### Which words have you learned so far? SPLAT

crust	extrusive	magma	crust	extrusive	magma
igneous rocks	granite	tremors	igneous rocks	granite	tremors
plate boundaries	lava	mantle	plate boundaries	lava	mantle
volcanoes	tectonic plates	earthquakes	volcanoes	tectonic plates	earthquakes
intrusive	liquid	crystals	intrusive	liquid	crystals
tsunami	pumice	basalt	tsunami	pumice	basalt



Basalt hexagonal columns - Giants Causeway - Photographed by Mr Morton Spring 2015