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| outhern River College | **Year 11 Earth and Environmental Science**  **Task 1: Cooling rates and crystal size** |

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| **Name:**  **Due Date:** | **Teacher:** | **Score: /32** |

**Background**:

Igneous rocks form from the tectonic activity in the Earth’s surface; from cooling of magma. When magma cools, crystals form because some minerals are in a very high abundance (super saturated). If magma cools quickly, there is not enough time for crystals to form, so they are very small. Similarly if magma cools slowly then there is enough time for crystals to form and hence you observe the formation of larger crystals.

**Aim:** In this investigation we will be investigating how the rate of cooling affects crystal size. There will also be a portion of the task set aside to identify whether particular igneous rocks were formed intrusive (inside the Earth, slow cooling) or extrusive (outside the Earth, fast cooling).

For this experiment you will need to design an experiment in order to investigate how cooling affects the formation of crystals. You will have available to you:

* 2 test tubes
* Test tube rack
* Magnetic Stirrer and hotplate
* Copper Sulfate
* String
* Gloves
* Ice Bath

**Variables:**

**Independent variable:**

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**Dependent variable**:

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**Controlled variables:**

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(4 marks)

**Hypothesis**: This should relate specifically to your experiment

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(2 marks)

**Method:** Describe the method in the box below

(5 marks)

**Results**: Describe the results for the experiment below. This needs to refer to the exact size of the crystals, and the relationship between fast cooling and slow cooling of the crystals.

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(3 marks)

**Discussion:**

Which method of cooling created the largest crystal size? Why was this so? **Ensure you reference a credible website to back up your findings**

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(3 marks)

Does this support or contradict your hypothesis?

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(2 marks)

Igneous rocks are formed from the crystallation of minerals released in magma. Intrusive igneous rocks form inside the Earth’s surface where high temperatures exist. Extrusive igneous rocks form outside the Earth’s surface where much cooler temperatures exist.

Using the information above can you complete the table below and rank whether each of the igneous rocks are formed extrusively or intrusively

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| **Rock Type** | **Crystal size** | **Intrusive or extrusive** |
| **Granite** |  |  |
| **Pumice** |  |  |
| **Gabbro** |  |  |
| **Obsidian** |  |  |
| **Pegmatite** |  |  |

(10 marks)

**Conclusion**: Write a conclusion for your experiment, referring to your results and hypothesis. How could you improve on the experiment?

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(3 marks)

***End of Assessment***