**8 SCIENCE INVESTIGATION**

COOLING AND CRYSTAL SIZE



Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Teacher:\_\_\_\_\_\_\_\_\_\_\_\_\_

Form:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Due date: \_\_\_\_\_\_\_\_\_\_\_

**IMPORTANT INFORMATION**

**Plagiarism**

The experiment is to be done in your science group but your write-up and results are to be done individually.

Plagiarising = instant zero on assignment and you will have to re-do it.

**Presentation**

Neat writing (if you struggle with this, type your information).

Correct spelling, grammar and full sentences.

Assignment neatly stapled together with this sheet attached to the front.

**Assessment policy**

Have sick note/legitimate reason from parent = new negotiated due date.

Assignment not submitted on due date and no sick note from parents = -20% mark

Assignment not submitted on new negotiated due date = -40% mark

+ Letter home to parents

+ Must attend academic completion to complete assignment

**OR**

Submit assignment to student services before academic completion date and academic completion not necessary.

Academic completion not attended = zero on assignment + Saturday detention

**If you know that you cannot submit your assignment on the due date, let your teacher know BEFORE the due date (email them if you are not in school) or just email them your assignment the night before.**

**Introduction**

You have looked at igneous rocks and how crystals are formed when the magma cools and solidifies (p. 280 Pearson 8).

**Aim:** To investigate how cooling rate affects the size of crystals.

**Materials:**

⬩ Safety glasses. ⬩ 1 x oven mitt or towel.

⬩ Bench mat. ⬩ Bunsen burner.

⬩ Tripod. ⬩ Gauze mat.

⬩ 3 x 50mL test-tubes. ⬩ 1 x test-tube rack.

⬩ Stirring rod. ⬩ 25g potassium alum.

⬩ 100mL water. ⬩ 1 x pair rubber gloves.

⬩ Ice water (enough to almost fill beaker). ⬩ Filter funnel.

⬩ Cotton wool(enough to fill beaker).

**Independent variable: (1 mark)**

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**Dependent variable: (1 mark)**

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**Hypothesis: (2 marks)**

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**Method**

1. Put 100mL water into a 250mL beaker and heat over a Bunsen burner until boiling.

2. While the water is heating up, make an ice bath by half-filling the second beaker with ice water.

3. Once the water is boiling, turn the Bunsen burner off.

4. Insulate the third beaker with enough cotton wool to allow a test-tube to sit upright in the middle.

5. Using the oven mit carefully lift beaker of hot water off the tripod and put on the bench protector.

6. Put the potassium alum in the hot water and stir it well until it is dissolved.

7. Place three test-tubes in the test tube rack. Use a filter funnel to pour 25mL of the solution into each test-tube (they should be around half full).

8. Plug each test-tube with cotton wool.

9. Place one test-tube in the cotton wool beaker, one in the ice water beaker and one in the empty beaker.

10. Leave the beakers in a safe place for a day.

11. Observe the contents of the test-tubes the next day and record your observations.

**Results:**

**a.** Diagram: draw a diagram of the **beaker of water boiling over the Bunsen burner** using lead pencil.

Label the diagram using a ruler to draw a line and lead pencil to write.

(Use scientific drawings from p. 19 Pearson 8).  **(3 marks)**

**b.** Diagram: draw a diagram of the **final equipment set up** using lead pencil.

Label the diagram using a ruler to draw a line and lead pencil to write.

(Use scientific drawings from p. 19 Pearson 8).  **(3 marks)**

**Table** (show results taken from experiment). **(3 marks)**

**Graph:** show your group results. **Draw on graph paper and attach. (6 marks)**

- Use graph paper.

- Use a sharp pencil and ruler.

- Have a title at the top (independent variable versus dependent variable).

- Work out whether you need to draw a bar graph (different groups of data) or a line graph (showing data changing over time).

- Put the independent variable and dependent variable on the correct axis.

- Label each axis.

- Record the units of measurement in brackets next to each label.

- Use an appropriate scale that has the same pattern the whole way along.

**Discussion:** (describe two mistakes/errors that occurred, Explain how they affected the results and how they could be avoided next time)  **(6 marks)**

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**1.** State which test-tube had the biggest crystals and which had the smallest crystals. **(1 mark)**

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**2.** State which test-tube cooled the fastest and which cooled the slowest.**(1 mark)**

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**3.** Use the results of the experiment to explain the difference between crystal sizes in extrusive and intrusive igneous rocks. **(3 marks)**

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**4.** State the three other names that potassium alum is known as. **(3 marks)**

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**5a.** Write the chemical formula for potassium alum.  **(1 mark)**

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**b.** List each element symbol and the number of atoms of each element that is in the compound.

**(4 marks)** \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**6.** Describe two safety measures your group took during the experiment. **(2 marks)**

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**Conclusion:** (first sentence gives general result of experiment, second sentence states whether hypothesis was proven or not proven. Minimum two sentences explaining the results with scientific reasons). **(4 marks)**

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**MARKING KEY**

|  |  |  |  |
| --- | --- | --- | --- |
| **Content** | **Description** |  | **Your**  **mark** |
| Independent  Variable | Listed the dependent variable. | 1 |  |
| Dependent  Variable | Listed the dependent variable. | 1 |  |
| Hypothesis | Correctly worded (e.g. if, then statement).  Includes both dependent and independent variable. | 1  1 |  |
| Diagram a) | Drawn neatly in pencil and with ruler for labels.  Correct labels.  Diagrams use scientific drawings. | 1  1  1 |  |
| Diagram b) | Drawn neatly in pencil and with ruler for labels.  Correct labels.  Diagrams use scientific drawings. | 1  1  1 |  |
| Results  table | Drawn neatly in pencil and using a ruler.  Includes the headings and units of measurement.  Includes all the data collected during the experiment. | 1  1  1 |  |
| Results  graph | Shows the results, includes all the things a graph requires. | 6 |  |
| Discussion | Describes at least two mistakes/errors that occurred.  Explains how these mistakes/errors affected the results.  Explains how these mistakes/errors could be avoided. | 2  2  2 |  |
| Discussion  questions |  | 15 |  |
| Conclusion | One sentence stating the result of the experiment.  One sentence stating whether hypothesis was proven or disproven.  Two sentences explaining scientific reasons for the results. | 1  1  2 |  |
| Presentation | Correct spelling.  Correct grammar, full sentences.  Written neatly or typed up neatly.  Uses appropriate scientific language. | 1  1  1  1 |  |
| **Total mark** | | 48 |  |

Mark as percentage %

Teacher’s comments:

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