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| **Instrument Number 2** | | | **Term 2 2024** | |
| **Student Name** |  | **Handout Date** (Week Beginning) | | 15/04/2024 |
| **Teacher Name** |  | **Interim Check Date** | | Ongoing |
| **Unit Number/Name** |  | **Rough Draft Date** | | Ongoing |
| **Due Date** | | **7/05/2024** |

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| **Assessment** | Student Experiment |
| **Time/Length** | Three weeks |
| **Assessment Conditions** | Group work conducting experiment, Individual work during report writing. |

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| **Criterion** | **Marks** | **Grade** |
| **Scientific Inquiry** | /38 |  |

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| **Differentiation: If assessment conditions have been adjusted details are provided below**  All student will receive a physical copy of this task sheet.  Max Grade achievable C+ = Completion of this scaffolded task sheet. Must be Handwritten.  Max Grade achievable A+ = Completion of an electronic report with appropriate section headings, tables, and excel graph. This option does not include completing an electronic version of this scaffolded document. |
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| **Acknowledgement of assessment responsibility** |  |
| I understand the consequences of plagiarism/cheating and confirm this is my own work. | |
| **Student Signature:** | **Date:** ……………………………… |

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| B:\Common\_NEW MSHS LOGO\NEW LOGO - B&W\BW-Shield Only white outline.png | **Maroochydore State High School**  **Standards Matrix for Year** 10 **Science Chemistry** |

|  | | A | | B | C | | D | E | | | |
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|  | | The folio of student work has the following characteristics: | | | | | | | |
| Science inquiry skills | Questioning and predicting | development of rationale and justified hypotheses that can be investigated scientifically | development of rationale and informed hypotheses that can be investigated scientifically | | development of rationale and hypotheses | guided development of rationale and hypotheses | | | directed development of rationale and hypotheses | |
| Planning and conducting  (including field work and laboratory experimentation) | * independent design and justified improvements to appropriate methods of investigation * accurate and systematic collection and recording of reliable data | * independent design and informed improvements to appropriate methods of investigation * accurate and systematic collection and recording of data | | * independent design and improvement of appropriate methods of investigation | partial design of methods of investigation that consider fairness, reliability, safety and ethical actions | | | * use of provided methods of investigation * identification of safety considerations | |
| Processing and analysing data and information | identification and justification of plausible alternative explanations for findings and justified explanation of any sources of uncertainty when:   * analysing data * selecting evidence to develop and justify conclusions | identification of plausible alternative explanations for findings and informed explanation of any sources of uncertainty when:   * analysing data * selecting evidence to develop and justify conclusions | | identification of alternative explanations for findings and explanation of any sources of uncertainty when:   * analysing data * selecting evidence to develop and justify conclusions | * statements about alternative explanations * identification of patterns in data * drawing of conclusions | | | statements about:   * alternative explanations * data and findings | |
| Communicating | concise and coherent communication of science ideas for specific purposes through:   * construction of justified evidence-based arguments * discerning selection of appropriate representations and text types | coherent communication of science ideas for specific purposes through:   * construction of informed evidence-based arguments * informed selection of appropriate representations and text types | | communication of science ideas for specific purposes through:   * construction of evidence-based arguments * selection of appropriate representations and text types | communication of science ideas for specific purposes through:   * construction of arguments * selection of representations, everyday language and text types | | | fragmented communication of science ideas for specific purposes | |
|  |  | **A+ ≥36 A ≥32 A- ≥30** | **B+ ≥28½ B≥ 27 B- ≥24½** | | **C+ ≥23 C ≥19 C- ≥17** | **D+ ≥15½ D ≥11 D- ≥9½** | | | **E+ ≥8 E ≥3 E- <2** | |

**Teacher feedback:**

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| **Assessment type:** **Student Experiment**  **Purpose:**   * To use the scientific method to design and safely perform an experiment to investigate reaction rates * To represent data using correct genre (tables, graphs) * To analyse data and reach conclusions   **Task conditions:**   * Groups of three/four for the experiment. * Individual reports must be written. * All student will receive a physical copy of this task sheet. * Max Grade achievable C+ = Completion of this scaffolded task sheet. Must be Handwritten. * Max Grade achievable A+ = Completion of an electronic report with appropriate section headings, tables, and excel graph. This option does **not** include completing an electronic version of this scaffolded document – the report must use a report style format and genre (no scaffolding) * Class time allotted: Term 2, Weeks 1 to 3.   **Topic:**  The effect of temperature on the rate of a reaction between sodium thiosulphate and hydrochloric acid.  OR  The effect of concentration on the rate of a reaction between sodium thiosulphate and hydrochloric acid. |

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| ***SCAFFOLDED TASK SHEET – Handwritten completion of this is graded at a C+ MAXIMUM*** Reaction Rate **Student Experiment**  Investigating the effect of Concentration or Temperature on the rate of a reaction | |
| **Rationale**  Write three paragraphs in formal scientific style (in 3rd person).  Do not use “you”, “us”, “we”, “they”, “our” or other personal pronouns.  **1st Paragraph** – answer the following Qs in full sentences to make a paragraph   * What is “rate of reaction”? * Why is the study of rates of reaction important to society? * What is one example where rates of reaction is important in your personal life or in society?   **2nd Paragraph** - explain in some detail (3 to 4 sentences) to make a short paragraph   * Why does changing the concentration OR temperature (you choose which one depending on the exp you have chosen to do) change the rate of a reaction?   **3rd Paragraph** – answer the following Qs in full sentences to make a paragraph   * What reaction are you going to investigate? * What change are you going to make (concentration of …, or temperature) during the experiment? * What will you be measuring (your dependent variable) during the experiment and how will you be measuring it?   At the end of your introduction write any website addresses you have used  **/ 6** | **Rationale:**   |  | | --- | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |
| **Aim**  **Complete the sentence** on the right  **/ 1** | **Aim** - To investigate how changing the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ causes a change in the **reaction rate**. |
| **Hypothesis**  **Write two sentences**.  The 1st sentence states what you expect to find out.  The 2nd states why you expect this to happen. (justification)  **/ 2** | **Hypothesis:**   |  | | --- | |  | |  | |  | |  | |

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| **Method**  **Independent** variable is the one you are changing deliberately.  The **dependent** variable is the one you measure.  **Controlled** variables are those you try to keep the same all the time.  **/ 2**  **Draw** a neat and **labelled** diagram of your setup  (when writing your method refer to it as diagram 1).  **/ 2**  Write a numbered list of steps.  Each step describes something you did in the experiment.  You can use either past tense (“the solution was poured” or present tense (“pour the solution”) but DO NOT mix tense.  Do not use personal pronouns such as “you”, “us”, “we”, or “they”.  **/ 4** | INDEPENDENT VARIABLE: (one only) :\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  DEPENDENT VARIABLE: (one only)\_ :\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  CONTROLLED VARIABLES: (at least 2) :\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  **Method:**  Diagram 1   |  | | --- | | 1. | | 2. | | 3. | | 4. | | 5. | | 6. | | 7. | | 8. | |
| **Materials**  **List** all the equipment and all the chemicalsyou used  **/2** | **Materials:**   |  |  |  | | --- | --- | --- | |  |  |  | |  |  |  | |  |  |  | |  |  |  | |  |  |  | |
| **Risk assessment**    **Fill** in the table for the things in your experiment which may be a source of harm.  Check with your teacher for some if you are not sure.  **/ 2** | |  |  |  |  | | --- | --- | --- | --- | | Source of risk | What amount of harm could it cause? (circle) | Safety precautions taken | If an incident occurred what should I do? | |  | Minor  Significant  major |  |  | |  | Minor  Significant  major |  |  |   **Risk assessment:** Table 1 – Possible risks in experiment |
| **Results**   1. Put in the heading for the first column. It is your independent variable (Concentration of … or Temperature). Remember to put in units. 2. You should fill this table with data. That means doing the experiment with 5 different concentrations or 5 temperatures. For each one of these you should do 3 trials.      1. If one of your results “looks odd” you may want to put an \* next to it and note it as a source of error – put this note in underneath the table.   **/ 4** | **Results:**  Table 2: Rate and times for the reaction   |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | Concentration OR Temperature (and units) | **TIME for reaction to occur (secs)** | | | | Average Rate (s-1) | | Trial 1 | Trial 2 | Trial 3 | Average time | |  |  |  |  |  |  | |  |  |  |  |  |  | |  |  |  |  |  |  | |  |  |  |  |  |  | |  |  |  |  |  |  | |
| **Graph** of your Rates of reaction values versus your independent variable.  Fill in the title for the bottom (horizontal axis)  Choose your scale carefully so it covers most of the graph.  You should have 5 data points (crosses) on your graph  Look at all 5 data points carefully. What pattern or “trend” do they make? **Draw the trend line** where you think the “trend” or “pattern” of the dots is.  The trend line does not have to go through all, or even any of the dots, but MUST correctly show the pattern in the data.  **/ 5** | Graph 1: Rate of reaction versus \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Rate of Reaction (s-1)   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ ( )  Concentration or Temperature (and units) |
| **Analysis of results**  Have a careful look at the trend line and decide what the trend line is telling you about how the rate is affected.   * **1St Paragraph**   **Complete** the simple first sentence shown in the analysis. This is a brief and simple description of your trend**.** Add more sentences if you can describe the trend with some more detail (straight line, curved?).  **Explain** why you think this by quoting some data from the table or graph to support your sentences.  Is there anything else about the results you could describe (not uncertainty or errors yet, they come later). If you notice something else, write another paragraph about this.   * **2nd Paragraph**   **Is there any uncertainty in the data?** Uncertainty is when the data varies so much you cannot really be certain of its pattern. There are two ways data varies, and both are explained below. **Write** a sentence about whether you have any uncertainty in the data, and how much uncertainty there is. Then you have to **explain** why you think this Use the two points below to explain).  **See below for some help in deciding if there is uncertainty in the data.**  **To judge uncertainty …ask these 2 Qs**:  **1s**t **Q**– Look at each set of three trials you have in your results table. In a “perfectly” conducted experiment all three trials would give the same number. **Is the time for each trial close to the other two trials?** **Was this the case in all five sets of data**? If the trials were close, you do not have much uncertainty in your data. If the three trials are quite different to each other then you have uncertainty.  **2nd –**look at how close your five points are to the trend line. In a “perfect” experiment they would all be on the trend line. **How close are the points to the trend line?** If you points are a little “scattered”, then you have some uncertainty in the trend, and your trend is not reliable.  **/5** | **Analysis:**   |  | | --- | | As \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ increases, the rate of the reaction \_\_\_\_\_\_\_\_\_\_\_\_\_. | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |
| **Conclusion**   * **1St Paragraph**   **Write** a sentence that **explains** what your results show. This can be what your trend line tells you. This sentence is your **main conclusion**.  **State** whether this result agrees with what should have happened according to theory (this should be in the second part of your intro). In a couple of sentences, **explain** how the theory explains your results.   * **2nd Paragraph**   **Write** a sentence about the amount of uncertainty in your investigation. **Explain** how this uncertainty occurred. Provide suggestions to improve the experiment so this uncertainty could be avoided (usually this means explaining what mistakes or errors you made and how to fix them). State if your conclusion is valid or not. Your conclusion will not be valid if you have too much uncertainty, but would be considered valid if there is only a small amount of error. For example, some uncertainty in your data AND some uncertainty in your trend would be considered too much uncertainty…making your conclusion lack validity.  **/ 3** | **Conclusion:**   |  | | --- | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |  | |