	Bremer State High School	
	Student name:	**Student number:**
	Teacher name: Mrs Shepherd	
	Date handed out: 18 February 2025	**Date due: 30 April 2025 by 9:00am**

Subject	Chemistry	**Instrument no.**	FIA2
Technique	Student Experiment		
Unit	Unit 1: Chemical fundamentals – structure, properties and reactions		
Topic	Topic 3: Chemical reactions – reactants, products and energy change		

Conditions			
Duration	10 hours class time		
Mode	Written response — Scientific Report	**Length**	1500 – 2000 words
Individual/ group	Group work with individual report	**Other**	May work collaboratively to develop methodology and perform experiment. All other elements are individual work.
Resources available	School library (online: internet and school intranet, databases, journals)		

Context

You have completed the following experiment:

- Enthalpy of combustion for burning foods

Task

Modify (i.e. refine, extend or redirect) an experiment in order to address your own related hypothesis or question.

You may use a practical performed in class, a related simulation or another practical related to Unit 1 (as negotiated with your teacher) as the basis for your methodology and research question.

To complete this task, you must:

- identify an experiment to modify*
- develop a research question to be investigated*
- research relevant background scientific information to inform the modification of the research question and methodology
- conduct a risk assessment and account for risks in the methodology*
- conduct the experiment*
- collect relevant qualitative data and/or quantitative data to address the research question*
- process and present the data appropriately
- analyse the evidence to identify trends, patterns or relationships
- analyse the evidence to identify uncertainty and limitations
- interpret the evidence to draw conclusion/s to the research question
- evaluate the reliability and validity of the experimental process
- suggest possible improvements and/or extensions to the experiment
- communicate findings in an appropriate scientific genre, i.e. scientific report.

*The steps indicated with an asterisk above may be completed in groups. All other elements must be completed individually.

Stimulus

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Checkpoints

☐ Week 5 Lesson 1 – Research Question

☐ Week 6 Lesson 1 – Rationale

☐ Week 7 Lesson 1 – Analysis of Data

☐ Week 9 Thursday – **Full draft due before 9:00am**

Assessment objective/s

1. Describe ideas and findings about properties and structure of atoms and materials, and chemical reactions in terms of reactants, products and energy change.
2. Apply understanding of properties and structure of atoms and materials, and chemical reactions in terms of reactants, products and energy change.
3. Analyse data about properties and structure of atoms and materials, and chemical reactions in terms of reactants, products and energy change.
4. Interpret evidence about properties and structure of atoms and materials, and chemical reactions in terms of reactants, products and energy change.
5. Evaluate processes, claims and conclusions about properties and structure of atoms and materials, and chemical reactions in terms of reactants, products and energy change.
6. Investigate phenomena associated with properties and structure of atoms and materials, and chemical reactions in terms of reactants, products and energy change.

Feedback

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Authentication strategies

- The teacher will provide class time for task completion.
- Students will provide documentation of their progress at indicated checkpoints.
- The teacher will collect and annotate drafts.
- The teacher will conduct interviews or consultations with each student as they develop the response.
- Students will use plagiarism-detection software at submission of the response.
- Students must acknowledge all sources.
- The teacher will provide class time for task completion.
- Students will provide documentation of their progress at indicated checkpoints.

Scaffolding

The response must be presented using an appropriate scientific genre (i.e. scientific report) and contain:

- a research question
- a rationale for the experiment
- reference to the initial experiment and identification and justification of modifications to the methodology
- raw and processed qualitative data and/or quantitative data
- analysis of the evidence
- conclusion/s based on the interpretation of the evidence
- an evaluation of the methodology and suggestions of improvements and extensions to the experiment
- a reference list.

An example of how one of the practicals could be modified to develop a research question:

Practical that will be modified: Electrolysis of water (simulation).
Research question: How does changing the concentration of the electrolyte (KOH) affect the time to produce 25 mL of hydrogen gas by electrolysis?

Developing the research question:

Steps	Details
Identify the independent variable to be investigated.	Concentration of KOH (electrolyte).
Identify the dependent variable.	Time to produce 25 mL hydrogen gas.
Identify the methodology to be used.	Electrolysis.
Draft research questions.	How can the concentration change the amount of hydrogen gas produced? How can the addition of an acid or base act as an electrolyte to make hydrogen?
Refine and focus the research question.	Can a change in concentration of a basic electrolyte affect the time to make hydrogen gas?
Present research question to teacher for approval.	How does changing the concentration of the electrolyte (KOH) affect the time to produce 25 mL of hydrogen gas by electrolysis?

Note: You cannot use this sample research question for your experiment.

Instrument-specific marking guide (ISMG)

Forming	Marks
The student response has the following characteristics:	
• a considered rationale for the experiment • justified modifications to the methodology • a specific and relevant research question • a methodology that enables the collection of sufficient and relevant data • appropriate use of genre and referencing conventions	4–5
• a reasonable rationale for the experiment • feasible modifications to the methodology • a relevant research question • a methodology that enables the collection of relevant data • use of basic genre and referencing conventions	2–3
• a vague or irrelevant rationale for the experiment • inappropriate modifications to the methodology • an inappropriate research question • a methodology that causes the collection of insufficient and irrelevant data • inadequate use of genre and referencing conventions.	1
The student response does not match any of the descriptors above.	0

Finding	Marks
The student response has the following characteristics:	
• considered management of risks/ethical issues/environmental issues • collection of sufficient and relevant raw data • fluent and concise use of scientific language and representations	4–5
• management of risks/ethical issues/environmental issues • collection of relevant raw data • competent use of scientific language and representations	2–3
• inadequate management of risks/ethical issues/environmental issues • collection of insufficient and irrelevant raw data • simplistic use of language and representations.	1
The student response does not match any of the descriptors above.	0

Analysing	Marks
The student response has the following characteristics:	
• correct and relevant processing of data • thorough identification of relevant trends/patterns/relationships • thorough and appropriate identification of the uncertainty and limitations of evidence	4–5
• basic processing of data • identification of obvious trends/patterns/relationships • basic identification of uncertainty and/or limitations of evidence	2–3
• incorrect or irrelevant processing of data • identification of incorrect or irrelevant trends/patterns/relationships • incorrect or insufficient identification of uncertainty and limitations of evidence.	1
The student response does not match any of the descriptors above.	0

Interpreting and Evaluating	Marks
The student response has the following characteristics:	
• justified conclusion/s linked to the research question • justified discussion of the reliability and validity of the experimental process • suggested improvements and extensions to the experiment that are logically derived from the analysis of evidence	4–5
• reasonable conclusion/s relevant to the research question • reasonable description of the reliability and/or validity of the experimental process • suggested improvements and/or extensions to the experiment that are related to the analysis of evidence	2–3
• inappropriate or irrelevant conclusion/s • cursory or simplistic statements about the reliability and validity of the experimental process • ineffective or irrelevant suggestions.	1
The student response does not match any of the descriptors above.	0