Gymea Technology High School
INSPIRE. LEARN. SUCCEED.

Year 11, Chemistry

Task 3: Depth Study

Due Date: Monday 03/08/2026, 3pm

Task Distributed: 12/06/2026

Unit: Module 3

Task Type: Depth Study

Task Weighting: 30%

Outcomes: CH11/12-1, CH11/12-2, CH11/12-3, CH11/12-4, CH11/12-5, CH11/12-6, CH11/12-7, CH11-10

Task Description

Chemical reactions occur at many different rates. The explosion of gunpowder and the combustion of petrol in a car's engine occur very quickly. On the other hand, the ripening of fruit and the rusting or iron occur quite slowly. It is important to appreciate that collisions between reactant particles do not always result in a chemical reaction. For example, while a car's fuel tank is being filled with petrol, the hydrocarbon molecules in fuel are colliding with oxygen molecules in the air without a reaction occurring.

This depth study will involve a practical investigation into a factor which affect the rate of chemical reactions. You will be required to investigate how varying conditions can affect the collision of reactant molecules in order to drive a chemical change.

Your task:

INVESTIGATION : Plan, perform and write-up an investigation determining how the **concentration of reactants OR temperature of reactants OR surface area** affects the rate of reaction between calcium carbonate and hydrochloric acid.

NOTE: Both the plan and conducting of the experiment, as well as the submitted written report should be done individually.

NESA Glossary of Key Words

Understand the verb associated with the task. The verb will provide an understanding of the detail needed to successfully answer the question.

- **Explain**
  Relate cause and effect; make the relationships between things evident; provide why and/or how
- **Investigate**
  Plan, inquire into and draw conclusions about

Check the NESA Glossary of Key Words for further guidance https://educationstandards.nsw.edu.au/wps/portal/nesa/11-12/hsc/hsc-student-guide/glossary-keywords

Details of Submission

As per NESA requirements, the depth study will be conducted during class time in your Chemistry lessons, and at home.

The report must be completed using Google Docs, and submitted on or before 3pm on the due date, by uploading to the Google Classroom submission point.

Teacher Feedback and Student Self-Reflection

- The task will typically be returned to students within 14 days of the due date.
- At this time feedback, including information on how to improve, will be provided through written annotations on your assessment.
- Students can clarify or seek further feedback by speaking with their teacher or the assessment marker.

Upon return of the task, students will also be expected to complete a self-reflection.

This will be written self-reflection activity where students should identified strengths and weaknesses.

How does this link to my learning?

- This depth study will demonstrate student ability analyses and evaluates primary and secondary data and information
- The depth study will enable students to further develop of one or more concepts found within or inspired by the syllabus.

Assessment Procedures

All students should be fully aware of the School Assessment Procedures for their year group. These were provided at the beginning of the school year and are available off the school website under the Learning Tab for each year group.

PART 1 *Outcomes*	**0 marks**	**1 mark**	**2 marks**	**3 marks**	**Marks**
Questioning and predicting CH11/12-1 develops and evaluates questions and hypotheses for scientific investigation	No Title Present	Title is a single sentence which is specific and related to what the experiment is investigating.			
	No Aim Present	A sentence or two specifically stating the purpose of the experiment which specifically refers to both the independent and dependant variables			
	No Introduction present	Demonstrates limited knowledge of the underlying chemistry and how the chosen factor affects the rate of reaction.	Demonstrates substantial knowledge of the underlying chemistry and how the chosen factor affects the rate of reaction. May have an incomplete explanation relating cause and effect or errors in relevant balanced equations.	Demonstrates an extensive knowledge of the underlying chemistry and how the chosen factor affects the rate of reaction. Explanation relates cause and effect; makes the relationship between things evident and provides why and/or how. Includes all relevant balanced equations.	
Planning investigations CH11/12-2 designs and evaluates investigations in order to obtain primary and secondary data and information	No Variables Identified	Some errors identifying Independent, Dependant and all significant variables that need to be kept the same.	Correctly identifies Independent, Dependant and all significant variables kept the same.		
	No Hypothesis Included	Statement clearly states how the independent variable affects the dependant variable and links to background research.			

	No Risk Assessment Included.	Incomplete risk assessment with either minimal risks identified and/or precautions not identified or stated in enough detail.	All relevant risks stated in sufficient detail explaining the potential harm and all relevant precautions stated in sufficient detail		
	No Equipment List	All equipment stated as referenced in the method.			
	No Method Included	Incomplete method that is not logical with significant errors or missing sections.	Some errors in method or is not in clear concise. May have errors in the labelled scientific diagram, missing relevant steps and/or does not identify specific quantitative amounts.	Correct method is concise with easy to follow steps. Includes a labelled scientific diagram, all relevant steps and identifies specific quantitative amounts. Does not include any personal language.	
Conducting investigations CH11/12-3 conducts investigations to collect valid and reliable primary and secondary data and information	Student was not safe or did not conduct the experiment themselves.	Student collected primary data in the laboratory without teacher assistance in a safe manner.			

Processing data and information CH11/12-4 selects and processes appropriate qualitative and quantitative data and information using a range of appropriate media	No Results Table Included	Results maybe illogically formatted with headings containing units. Includes a correct calculation of average and qualitative observations where appropriate.	Results are tabulated and logically formatted with headings containing units. Includes a correct calculation of average and qualitative observations where appropriate.		
	No Results Graph Included	Results graph is not of average data and has significant features missing.	Results Graph is of average data but a may have the following features missing or incorrect; specific title, appropriately labelled axis, an even scale on each axis, points marked precisely and a line of best fit.	Results Graph is of average data and has the following features; specific title, appropriately labelled axis, an even scale on each axis, points marked precisely and a line of best fit.	
Analysing data and information CH11/12-5 analyses and evaluates primary and secondary data and information	No Discussion of Results	Communicates interpretation of results. May show some linkage to background research	Succinctly and logically communicates interpretation of results, showing extensive linkage to background research		
Problem solving CH11/12-6 solves scientific problems using primary and secondary data,	No Discussion of Accuracy	Discussion of some equipment and limitations	Extensive discussion of relevant equipment and limitations of accuracy		

critical thinking skills and scientific processes	No Discussion of Reliability	Discussion about reliability but may be incomplete or does not link to results	Extensive discussion of reliability with specific reference to results		
	No Discussion of Validity	Discussion about validity but may be incomplete or does not link to experimental method, design and variables	Succinct and logical discussion of validity with specific reference to experimental method, design and variables		
	No improvements in experiment discussed.	Discussion about mistakes, accuracy, reliability and validity and potential improvement of each of these aspects but maybe incomplete or missing sections	Communicates succinctly and logically an understanding of mistakes, accuracy, reliability and validity and potential improvement of each of these aspects.		
	No Conclusion Included	Conclusion relates to the aim and states whether the hypothesis was met.			
Communicating CH11/12-7 communicates scientific understanding using suitable language and terminology for a specific audience or purpose	Report is very brief with sections missing and with incorrect information.	Report is brief AND/OR difficult to read. Sections miss key information or contain incorrect information.	Uses appropriate language on the whole for a specific audience and displays good written communication but it does contain areas that are unclear or hard to understand.	Uses appropriate language proficiently for a specific audience and displays very high quality written communication which is clear and concise.	
	Most of the report is grammatically incorrect.	Spelling, grammar, and formatting have many errors.	Spelling, grammar, and formatting of report is to good standard but contains some errors.	Spelling, grammar, and formatting of report is to a very high standard and adds to clarity of writing. There are very minor or no errors.	

	No reference list.	The reference list is missing or contains many mistakes and missing.	There is a reference list that contains all sources used in text. The sources are referenced with a few mistakes and inconsistencies.	There is a reference list that contains all sources used in text. The sources are consistently and correctly referenced with minor or no mistakes.	
	Most of the explanation is grammatically incorrect.	Spelling, grammar, and formatting have many errors.	Spelling, grammar, and formatting of report is to good standard but contains some errors.	Spelling, grammar, and formatting of report is to a very high standard and adds to clarity of writing. There are very minor or no errors.	
	No reference list.	The reference list is missing or contains many mistakes and missing.	There is a reference list that contains all sources used in text. The sources are referenced with a few mistakes and inconsistencies.	There is a reference list that contains all sources used in text. The sources are consistently and correctly referenced with minor or no mistakes.	
	No evaluation of secondary sources.	There are some comments as to the relevance OR accuracy OR validity OR reliability of secondary sources. This may be weak.	There is an evaluation of secondary sources including relevance, accuracy, validity and reliability. Some aspects may be missing.	There is a very well-developed evaluation of secondary sources for relevance, accuracy, validity and reliability.	

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