



Chemistry 2025 v1.2

IA3: Sample assessment instrument

This sample has been compiled by the QCAA to assist and support teachers in planning and developing assessment instruments for individual school settings.

Student name	sample only
Student number	sample only
Teacher	sample only
Issued	sample only
Due date	sample only

Marking summary

Criterion	Marks allocated	Provisional marks
Forming and Finding	5	
Analysing	5	
Interpreting	5	
Evaluating	5	
Overall	20	

Conditions

Technique	Research investigation
Unit	Unit 4: Structure, synthesis and design
Topic/s	Topic 1: Properties and structure of organic materials Topic 2: Chemical synthesis and design
Duration	Approximately 10 hours of class time
Mode / length	Written: up to 2000 words
Individual / group	Individual
Resources	School library (online: internet and school intranet, databases, journals)

Context

Investigate one of the following claims:

- Developing new organic molecules/compounds requires computer modelling.
- Effective insecticides are chemically unreactive.
- Molecular manufacturing has revolutionised chemical.
- The industrial use of enzymes improves chemical synthesis.
- The synthesis of biofuels requires green chemistry.
- Green chemistry is clean chemistry.
- Not all plastics are bad.

You may identify an alternative claim in consultation with your teacher. This claim must be related to Unit 4 subject matter.

Task

Gather evidence related to a research question to evaluate a claim relevant to Unit 4 subject matter. Develop your research question based on a number of possible claims provided by your teacher.

Obtain evidence by researching scientifically credible sources, such as books and podcasts by well-credentialed scientists, 'popular' science websites or magazines, websites of governments, universities, independent research bodies or science and technology manufacturers and scientific journals. You must adhere to research conventions.

To complete this task, you must:

- select a claim to be evaluated, from a list provided by the teacher
- identify the relevant scientific concepts associated with the claim
- conduct research to gather evidence from scientifically credible sources to evaluate the claim
- pose a research question that addresses an aspect of the claim
- identify relevant evidence to answer the research question
- identify the trends, patterns or relationships in the evidence
- analyse the evidence to identify limitations
- interpret the evidence to construct scientific arguments
- interpret the evidence to form a conclusion to the research question
- discuss the quality of the evidence
- evaluate the claim by applying the findings of the research to the claim
- suggest improvements and/or extensions to the investigation
- communicate findings in an appropriate scientific genre, e.g. report, journal article, essay, conference presentation.

You may complete the following aspects of the task as a group:

- selecting a claim
- identifying the relevant scientific concepts associated with the claim
- conducting research.

Checkpoints

- ☐ Week 1: Select claim and develop research question.
- ☐ Week 2: Identify sources and conduct research.
- ☐ Week 3: Analyse and evaluate evidence.
- ☐ Week 4: Submit draft.
- ☐ Week 5: Submit final response.

Authentication strategies

- You will be provided class time for task completion.
- You will provide documentation of your progress at indicated checkpoints.
- Your teacher will collect and annotate a draft.
- Your teacher will conduct interviews or consultations as you develop the response.
- You will use plagiarism-detection software to submit your response.
- You must acknowledge all sources.

Scaffolding

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

- a claim
- a research question
- a rationale for the investigation
- justified scientific arguments using evidence
- a conclusion to the research question based on the interpretation of the evidence
- evaluation of the claim and suggestions of improvements and extensions to the investigation
- a reference list.

Example of how a claim could be developed into a research question

Claim: Not all plastics are bad.

Research question: What effect do catalysts have on the chemical recycling of polyethylene terephthalate (PET) by glycolysis?

Developing the research question:

1. Identify the key (important) terms in the claim.
 - a. 'plastics', 'bad'
2. Propose refining questions that need to be addressed to refine key terms and narrow the focus of the claim.
 - a. Which plastic will I investigate?
 - b. Why did I choose this plastic?
 - c. What do I mean by 'bad' and 'good' in chemical terms?
3. Provide an example of how one of the claims could be developed into a research question. Conduct research to gather information to address the refining questions.
 - a. The plastic that will be investigated is PET.
 - b. PET's structural and chemical properties make it a high-demand plastic that is not biodegradable. Therefore, it is a problem if not recycled.
 - c. PET can be recycled by a chemical process called glycolysis, which requires a catalyst.
 - d. Products from chemically recycling PET can be used as feedstock (raw materials) for other products.
4. Draft the research question to address the claim.
 - a. How does chemically recycling PET support PET being a resource rather than a problem?
5. Refine and focus the research question.
 - a. How does chemically recycling PET by glycolysis make PET a useful plastic?
 - b. What factors affect the chemical recycling of PET by glycolysis?
6. Present the research question to the teacher for approval.
 - a. What effect do catalysts have on the chemical recycling of polyethylene terephthalate (PET) by glycolysis?

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

Instrument-specific marking guide (IA3): Research investigation response (20%)

Forming and Finding	Marks
The student response has the following characteristics:	
<ul style="list-style-type: none"> a considered rationale identifying clear development of the research question from the claim a specific and relevant research question selection of sufficient and relevant sources appropriate use of genre conventions acknowledgment of sources of information through appropriate use of referencing conventions 	4–5
<ul style="list-style-type: none"> a reasonable rationale that links the research question and the claim a relevant research question selection of relevant sources use of basic genre conventions use of basic referencing conventions 	2–3
<ul style="list-style-type: none"> a vague or irrelevant rationale for the investigation an inappropriate research question selection of insufficient or irrelevant sources inadequate use of genre conventions inadequate acknowledgment of sources. 	1
The student response does not match any of the descriptors above.	0

Analysing	Marks
The student response has the following characteristics:	
<ul style="list-style-type: none"> the identification of sufficient and relevant evidence thorough identification of relevant trends/patterns/relationships in evidence thorough and appropriate identification of limitations of evidence 	4–5
<ul style="list-style-type: none"> the identification of relevant evidence identification of obvious trends/patterns/relationships in evidence basic identification of limitations of evidence 	2–3
<ul style="list-style-type: none"> the identification of insufficient and irrelevant evidence identification of incorrect or irrelevant trends/patterns/relationships in evidence incorrect or insufficient identification of limitations of evidence. 	1
The student response does not match any of the descriptors above.	0

Interpreting	Marks
The student response has the following characteristics:	
<ul style="list-style-type: none"> justified scientific argument/s justified conclusion linked to the research question fluent and concise use of scientific language/representations 	4–5
<ul style="list-style-type: none"> reasonable scientific argument/s reasonable conclusion relevant to the research question competent use of scientific language/representations 	2–3
<ul style="list-style-type: none"> inappropriate or irrelevant argument/s inappropriate or irrelevant conclusion incorrect use of language/representations. 	1
The student response does not match any of the descriptors above.	0

Evaluating	Marks
The student response has the following characteristics:	
<ul style="list-style-type: none"> justified discussion of the quality of evidence extrapolation of credible findings of the research to the claim suggested improvements and extensions to the investigation that are considered and relevant to the claim 	4–5
<ul style="list-style-type: none"> reasonable description of the quality of evidence application of relevant findings of the research to the claim suggested improvements and/or extensions to the investigation that are relevant to the claim 	2–3
<ul style="list-style-type: none"> cursory or simplistic statements about the quality of evidence application of insufficient or inappropriate findings of the research to the claim ineffective or irrelevant suggestions. 	1
The student response does not match any of the descriptors above.	0



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