Instrument-specific marking guide: Student Experiment (20%)

Criterion: Research and planning

- apply understanding of <topic> to modify experimental methodologies and process primary data
- investigate phenomena associated with <topic> through an experiment.

The student work has the following characteristics:	Marks	Analysis
• informed application of understanding of <topic> to modify experimental methodologies demonstrated by: - a considered rationale for the experiment - justified modifications to the methodology • effective and efficient investigation of <topic> demonstrated by: - a specific and relevant research question - a methodology that enables the collection of sufficient, relevant data - considered management of risks and ethical or environmental issues.	5–6	Only including what is relevant (no extra stuff) and addressing both the scientific concepts and justifying the importance of the research question Students state the modification and justify the importance of the change Clearly identifies the independent and dependant variable – links to topics studied Doesn't mean that they have collected sufficient (5 x 3 or what is appropriate for your subject), relevant data – it just means that the method they have designed should have allowed them to Appropriate risk summary and MSDS referred to
• adequate application of understanding of <topic> to modify experimental methodologies demonstrated by: - a reasonable rationale for the experiment - feasible modifications to the methodology • effective investigation of <topic> demonstrated by: - a relevant research question - a methodology that enables the collection of relevant data - management of risks and ethical or environmental issues.	3–4	The modifications do improve the practical but the student hasn't clearly stated why/how the modifications have improved the experiment Links to topic but doesn't make clear both variables This level doesn't include sufficient so the data might be good but they didn't collect enough May be vague or no MSDS data referred to
• rudimentary application of understanding of <topic> demonstrated by: - a vague or irrelevant rationale for the experiment - inappropriate modifications to the methodology • ineffective investigation of <topic> demonstrated by: - an inappropriate research question - a methodology that causes the collection of insufficient and irrelevant data - inadequate management of risks and ethical or environmental issues.	1–2	Both points not addressed, inappropriate content included Modifications don't help or make the experimental results worse Not linked to topic – identifies more than one dependent and independent variable
• does not satisfy any of the descriptors above.	0	

Criterion: Analysis of evidence

- interpret experimental evidence about <topic>
- evaluate experimental processes and conclusions about <topic>

The student work has the following characteristics:	Marks	Analysis
• insightful interpretation of experimental evidence about <topic> demonstrated by justified conclusion/s linked to the research question • critical evaluation of experimental processes about <topic> demonstrated by: - justified discussion of the reliability and validity of the experimental process - suggested improvements and extensions to the experiment, logically derived from the analysis of the evidence.	5–6	Link between experimental conclusion and research question must be really clear Link between experimental conclusion and research question must be really clear Can the student's experimental results be trusted? Why/why not? Improvements and extensions need to clearly link to the errors/limitations identified in the analysis of their results.
• adequate interpretation of experimental evidence about <topic> demonstrated by: - reasonable conclusion/s relevant to the research question • basic evaluation of experimental processes about <topic> demonstrated by: - reasonable description of the reliability and validity of the experimental process - suggested improvements and extensions to the experiment that are related to the analysis of evidence.	3–4	Conclusion drawn that makes sense but doesn't refer back to the original research question Suggestions/improvements made that would help but no link to errors to justify why they would help improve
• invalid interpretation of experimental evidence about <topic> demonstrated by inappropriate or irrelevant conclusion/s • superficial evaluation of experimental processes about <topic> demonstrated by - cursory or simplistic statements about the reliability and validity of the experimental process - ineffective or irrelevant suggestions.	1–2	
• does not satisfy any of the descriptors above.	0	

Criterion: Interpretation and evaluation

- apply understanding of <topic> to modify experimental methodologies and process primary data
- analyse experimental evidence about <topic>
- investigate <topic> through an experiment

The student work has the following characteristics:	Marks	Analysis
• appropriate application of algorithms, visual and graphical representations of data about <topic> demonstrated by correct and relevant processing of data • systematic and effective analysis of experimental evidence about <topic> demonstrated by: - thorough identification of relevant trends, patterns or relationships - thorough and appropriate identification of the uncertainty and limitations of evidence • effective and efficient investigation of <topic> demonstrated by the collection of sufficient and relevant raw data.	5–6	All algorithms needed are used and done correctly Everything needed to answer the research question has been identified This is where the quality of the data actually collected is judged.
• adequate application of algorithms, visual and graphical representations of data about <topic> demonstrated by basic processing of data • effective analysis of experimental evidence about <topic> demonstrated by - identification of obvious trends, patterns or relationships - basic identification of uncertainty and limitations of evidence • effective investigation of phenomena associated with <topic> demonstrated by the collection of relevant raw data.	3–4	Basic algorithms used correctly – nothing extra done. Possibly some small errors
• rudimentary application of algorithms, visual and graphical representations of data about <topic> demonstrated by incorrect or irrelevant processing of data • ineffective analysis of experimental evidence demonstrated by - identification of incorrect or irrelevant trends, patterns or relationships - incorrect or insufficient identification of uncertainty and limitations of evidence ineffective investigation of chemical <topic> demonstrated by the collection of insufficient and irrelevant raw data.	1–2	Significant errors!
• does not satisfy any of the descriptors above.	0	

Criterion: Communication

7. communicate understandings and research findings, arguments and conclusions about the properties and structure of organic materials or chemical synthesis and design

The student work has the following characteristics:	Marks	Analysis
• effective communication of understandings and research findings, arguments and conclusions about <topic> demonstrated by – fluent and concise use of scientific language and representations – appropriate use of genre conventions – acknowledgment of sources of information through appropriate use of referencing conventions.	2	It is almost impossible to get less than 2 in this section, unless you have not written in reasonable English, spelled things wrongly throughout (turn on spell check!) and you didn't include in-text referencing and a list of references. Obviously, use scientific terminology wherever appropriate; otherwise use normal, everyday spoken English. DO NOT look up fancy words in a Thesaurus; it is far better to write as you would speak.
• adequate communication of understandings and research findings, arguments and conclusions about <topic> demonstrated by – competent use of scientific language and representations - use of basic genre conventions – use of basic referencing conventions.	1	
• does not satisfy any of the descriptors above.	0	