**Stage 2 Chemistry**

**Assessment Type 1: Investigations Folio**

**Deconstruct and Design Practical Investigation**

“How do preparation methods and storage conditions

impact the nutritional value of cow’s milk?”

**Purpose:**

In this assessment, students will investigate how the storage conditions or methods of food preparation impact the nutritional value of cow’s milk. Students will individually deconstruct the problem, considering and measuring possible factors, formulate a hypothesis or investigable question, and design a general method that may be used to test this. Following deconstruction, students will conduct a practical in pairs and will then construct a practical report individually. They will present their results using appropriate conventions and formats, analyse and interpret data to formulate and justify conclusions and evaluate the procedure and its effects on data. Students will demonstrate knowledge and understanding of chemistry concepts and communicate knowledge and understanding of concepts using appropriate terms, conventions and representations.

**Conditions:**

* ***Part A*** - Work independently to deconstruct and design an investigation to determine how the storage conditions or methods of food preparation impact the nutritional value of cow’s milk. 1 double lesson to discuss as class + 1.5 weeks to complete deconstruct and design (maximum 4 pages).
* ***Part B*** – In small groups choose an appropriate method and undertake the practical investigation. 2 double lessons allocated.
* ***Part C*** – Complete an individual report for the investigation undertaken. 1 week to complete written report with a maximum 1500 words or a maximum of 9 minutes oral presentation or multimodal equivalent. Class and homework time given.

**Assessment Design Criteria**

IAE1 Deconstruction of a problem and design of a chemistry investigation.

IAE2 Obtaining, recording, and representation of data, using appropriate conventions and formats.

IAE3 Analysis and interpretation of data and other evidence to formulate and justify conclusions.

IAE4 Evaluation of procedures and their effect on data.

KA1 Demonstration of knowledge and understanding of chemical concepts.

KA4 Communication of knowledge and understanding of chemical concepts and information, using appropriate terms, conventions, and representations.

**Background Information**

Milk is an essential source of quality protein as well as a source of vitamins and minerals including calcium, B vitamins, potassium, phosphorus and vitamin A and D. Before milk is consumed, it is processed and stored. Processing operations like thermal treatment, chemical treatment, biochemical processing and physical storage conditions can have a positive or negative influence on nutritional quality of milk (Borad et al., 2017).

**Part A: Deconstruct and Design (evidence to be submitted on a summary sheet)**

* Students will work independently to deconstruct and design an investigation that can be undertaken to investigate how the storage conditions or methods of food preparation impact the nutritional value of cow’s milk.
* 1 double lesson to discuss as class + 1.5 weeks to complete deconstruct and design.

**Part B: Implementing an Investigation**

* In small groups students will choose an appropriate method to be undertaken (if all methods are unsuitable the teacher will provide you with one).
* Students will undertake the chosen investigation with two double lessons allocated.

**Part C: Written Report**

* Complete an individual report write up for the investigation undertaken.
* 1 week to complete written report.
* Maximum 1500 words or a maximum of 9 minutes oral presentation or multimodal equivalent.
* Class and homework time given. One draft.

**References**

Borad, S.G., Kumar, A. and Singh, A.K. (2017) *Effect of processing on nutritive values of milk protein*, *Critical reviews in food science and nutrition*. Available at: https://pubmed.ncbi.nlm.nih.gov/27052328/ (Accessed: 23 May 2023).

After conducting the practical, the data collected will be used to write an individual report. The report is to be a maximum of 1500 words.

The practical report should include the sections, outlined below:

* Introduction (with relevant biological concepts explained)
* Aim, hypothesis and list of variables identified
* Materials\*
* Method\*
* Safety and/or ethical risks\* (identification and management of these risks)
* Results (table/s and graph/s)\*
* Analysis (of results, identifying trends and linking results to concepts)
* Evaluation (of procedures and data, and identifying sources of uncertainty)
* Conclusion (with justification and awareness of limitations).

\*Not included in word count

Performance Standards for Stage 2 Chemistry

| - | Investigation, Analysis, and Evaluation | Knowledge and Application |
| --- | --- | --- |
| A | Critically deconstructs a problem and designs a logical and coherent chemistry investigation with detailed justification.  Obtains, records, and represents data, using appropriate conventions and formats accurately and highly effectively.  Systematically analyses and interprets data and evidence to formulate logical conclusions with detailed justification.  Critically and logically evaluates procedures and discusses their effect on data. | Demonstrates deep and broad knowledge and understanding of a range of chemical concepts.  Applies chemical concepts highly effectively in new and familiar contexts.  Critically explores and understands in depth the interaction between science and society.  Communicates knowledge and understanding of chemistry coherently, with highly effective use of appropriate terms, conventions, and representations. |
| B | Logically deconstructs a problem and designs a well-considered and clear chemistry investigation with reasonable justification.  Obtains, records, and represents data, using appropriate conventions and formats mostly accurately and effectively.  Logically analyses and interprets data and evidence to formulate suitable conclusions with reasonable justification.  Logically evaluates procedures and their effect on data. | Demonstrates some depth and breadth of knowledge and understanding of a range of chemical concepts.  Applies chemical concepts mostly effectively in new and familiar contexts.  Logically explores and understands in some depth the interaction between science and society.  Communicates knowledge and understanding of chemistry mostly coherently, with effective use of appropriate terms, conventions, and representations. |
| C | Deconstructs a problem and designs a considered and generally clear chemistry investigation with some justification.  Obtains, records, and represents data, using generally appropriate conventions and formats, with some errors but generally accurately and effectively.  Undertakes some analysis and interpretation of data and evidence to formulate generally appropriate conclusions with some justification.  Evaluates procedures and some of their effect on data. | Demonstrates knowledge and understanding of a general range of chemical concepts.  Applies chemical concepts generally effectively in new or familiar contexts.  Explores and understands aspects of the interaction between science and society.  Communicates knowledge and understanding of chemistry generally effectively, using some appropriate terms, conventions, and representations. |
| D | Prepares a basic deconstruction of a problem and an outline of a chemistry investigation.  Obtains, records, and represents data, using conventions and formats inconsistently, with occasional accuracy and effectiveness.  Describes data and undertakes some basic interpretation to formulate a basic conclusion.  Attempts to evaluate procedures or suggest an effect on data. | Demonstrates some basic knowledge and partial understanding of chemical concepts.  Applies some chemical concepts in familiar contexts.  Partially explores and recognises aspects of the interaction between science and society.  Communicates basic chemical information, using some appropriate terms, conventions, and/or representations. |
| E | Attempts a simple deconstruction of a problem and a procedure for a chemistry investigation.  Attempts to record and represent some data, with limited accuracy or effectiveness.  Attempts to describe results and/or interpret data to formulate a basic conclusion.  Acknowledges that procedures affect data. | Demonstrates limited recognition and awareness of chemical concepts.  Attempts to apply chemical concepts in familiar contexts.  Attempts to explore and identify an aspect of the interaction between science and society.  Attempts to communicate information about chemistry. |