 Assessment task notification

Year 11 - investigating science

Teacher:

Task Number:

Notification Date:       Term - Week

Weight:

Due Date:       Term – Week

Outcomes

* INS11/12-1 develops and evaluates questions and hypotheses for scientific investigation
* INS11/12-2 designs and evaluates investigations in order to obtain primary and secondary data and information
* INS11/12-3 conducts investigations to collect valid and reliable primary and secondary data and information
* INS11/12-7 communicates scientific understanding using suitable language and terminology for a specific audience or purpose
* INS11-8 identifies that the collection of primary and secondary data initiates scientific investigations

Task Description and Instructions

This depth study draws on students’ prior knowledge about everyday substances that are familiar to them. Teachers can easily differentiate the depth study as a guided or open-ended task so that it is accessible to all students. Students are encouraged to develop their own ideas about how to test their samples. Through the depth study, discussion and research can lead to questions about:

* why some soaps are more effective than others
* how soaps are different
* why antibacterial liquid soaps have become more popular and how effective are they
* how soaps, shampoos and detergents are different and why detergents rather than soaps, are used to clean clothes
* what effects do soaps, shampoos and detergents have on our environment
* what affects consumer preferences

It could also be used to follow or as a pre-study to making soap in the laboratory and looking at the science of saponification, how suds form and the chemistry of soaps and detergents.

Part 1 – pre-experimenting

Research the qualities and properties of your chosen context that make it the ‘best’ to use. Detail the science behind these properties.

Develop an inquiry question that can be tested in the laboratory. State the hypothesis to be tested.

Part 2 – collecting data

Plan and conduct a series of tests to compare at least three samples of soap, shampoo or detergent. You must collect data on both qualitative and quantitative properties to compare your samples and investigate your inquiry question. For each test, you are to write a concise procedure describing the method you used.

Suggested comparisons

| Qualitative | Quantitative |
| --- | --- |
| colour  texture/feel  uniformity/homogeneity  smell  ability to lather  hardness  ability to clean or remove dirt  lather stability  solubility | pH  density  emulsion rate (time taken for a mixture of soap/shampoo/detergent and oil, to remain an emulsion)  cost per gram  moisture content (for solid soap) |

Complete a risk analysis of your investigation, by using the risk matrix and completing the table below.

Part 3 – reporting back

You are a science journalist working for a media outlet that targets non-scientists as readers and consumers of your products. You are required to write an article that explains the differences between the soaps, shampoos or detergents that you have investigated so that readers can make informed decisions about what they buy.

In your article, you need to:

* give an assessment of the soaps, shampoos or detergents you have investigated
* show how your qualitative and quantitative data collected supports your assessment
* describe how your data was collected and how it allowed you to determine which product was the best
* explain how you ensured that you used fair testing methods in your investigation
* show scientific understanding of the properties of your product
* effectively communicate to your readers.

Assessment Criteria

Your task will be marked according to your ability to:

* develop an inquiry question
* write a hypothesis linking the dependent variable with the independent variable
* design a controlled experiment which
  + allows the inquiry question to be solved
  + includes safety considerations (risk assessment)
* perform the experiment
  + making qualitative and quantitative observations
  + making accurate measurements
  + safely
* use first-hand data to complete a science report targeted at consumers, which
  + provides an interesting heading that conveys a scientific idea
  + outlines the inquiry question and states the hypothesis
  + compares the products tested
  + describes the tests carried out and how fair testing methods were used
  + assesses the products based on data collected
  + uses scientific language and concepts to explain the properties of the chosen products
  + includes a conclusion which: answers the inquiry question, relates to the tested hypothesis, gives an assessment of the products for consumers
  + effectively communicates to readers.

| Risk Description | Consequence  1-5 | Likelihood  1-5 | Risk Rating  E/H/M/L | Precaution | New Consequence  1-5 | New Likelihood  1-5 | New Risk Rating  E/H/M/L |
| --- | --- | --- | --- | --- | --- | --- | --- |
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| Possible Consequences and Likelihood | Insignificant - 1  No injuries or support needed | Minor - 2  Minor injuries first aid treatment needed | Moderate - 3  Medical treatment needed | Major - 4  Extensive injuries  Hospital admission possible | Critical - 5  Many injuries  Widespread medical attention needed |
| --- | --- | --- | --- | --- | --- |
| Almost certain - 5 | M | M | H | E | E |
| Likely - 4 | L | M | H | H | E |
| Possible - 3 | L | M | M | H | H |
| Unlikely - 2 | L | L | M | M | H |
| Rare - 1 | L | L | L | M | M |

L – low, M – medium, H – high, E – extreme

Marking rubric

| Criteria | Marks |
| --- | --- |
| * describes the inquiry question * states a hypothesis linking the dependent variable with the independent variable * designs an investigation which allows the inquiry question to be solved * includes a risk assessment * performs the investigation making accurate qualitative and quantitative observations * uses data from the practical investigation to complete a science report targeted at consumers, which   + provides a clear heading that conveys a scientific idea   + outlines the inquiry question and states the hypothesis   + describes, in detail, the tests carried out and how fair testing methods were used   + provides detailed observations   + compares the products tested   + assesses the products based on data collected   + uses scientific language and concepts to explain the properties of the chosen products * includes a conclusion which:   + answers the inquiry question   + relates to the tested hypothesis   + gives an assessment of the products for consumers * effectively communicates to readers | 17-20 |
| * states the inquiry question * states a hypothesis linking the dependent variable with the independent variable * designs an investigation which allows the inquiry question to be solved * performs the investigation making qualitative and quantitative observations * uses data from the practical investigation to complete a science report targeted at consumers, which   + provides a clear heading that conveys an intended meaning   + outlines the inquiry question and states the hypothesis   + describes, in detail, the tests carried out   + describes observations made in the investigation   + uses scientific language and concepts correctly in the article * includes a conclusion which:   + answers the inquiry question   + relates to the tested hypothesis   + gives an assessment of the products for consumers * effectively communicates to readers | 13-16 |
| * states the inquiry question * states a hypothesis linking the dependent variable with the independent variable * designs an investigation which allows the inquiry question to be solved * performs the investigation making qualitative and quantitative observations * uses data from the practical investigation to complete a science report targeted at consumers, which   + provides a clear headline that conveys an intended meaning   + outlines the inquiry question and states the hypothesis   + describes the tests carried out   + describes observations made in the investigation   + assesses the products based on data collected   + uses scientific language and concepts to explain the properties of the chosen products * includes a conclusion which:   + answers the inquiry question   + relates to the tested hypothesis   + gives an assessment of the products for consumers * effectively communicates to readers | 9-12 |
| * states the inquiry question * states a hypothesis linking the dependent variable with the independent variable * designs an investigation which allows the inquiry question to be solved * includes a detailed risk assessment * performs the investigation making qualitative and quantitative observations * uses data from the practical investigation to complete a science report targeted at consumers, which   + provides a clear headline that conveys an intended meaning   + outlines the inquiry question   + describes several the tests carried out   + provides detailed data of observations made   + assesses the products based on data collected   + uses scientific language and concepts to explain the properties of the chosen products * includes a conclusion which:   + answers the inquiry question   + relates to the tested hypothesis   + gives an assessment of the products for consumers * effectively communicates to readers | 5-8 |
| * states the inquiry question or the aim of the investigation * designs an investigation which allows the inquiry question or aim to be solved * performs the investigation making some observations * uses data from the practical investigation to complete a science report targeted at consumers, which   + provides a clear heading   + outlines the inquiry question   + describes at least one of the tests carried out   + describes observations made   + uses some scientific language or refers to a scientific concept * includes a conclusion which:   + answers the inquiry question   + compares the products tested * communicates ideas in the written form to readers | 0-4 |