# JOHN EDMONDSON HIGH SCHOOL

## Assessment Notification

**Faculty: Science Course: Chemistry Year: 12**

**Assessment Task: Task 3: Firsthand Practical Investigation and Scientific Report – Depth Study**
**Assessment Weighting: 25% Due: Term 2 Week 9 Date: 27/06/2024**

**Task Type: Hand in Task ☒ In Class Task ☒ Practical Task ☒**

### Outcomes assessed (NESA)

- CH12-1 Develops and evaluates questions and hypothesis for scientific investigation.
- CH12-2 Designs and evaluates investigations in order to obtain primary and secondary data and information.
- CH12-3 Conducts investigations to collect valid and reliable secondary data and information.
- CH12-4 Selects and processes appropriate qualitative and quantitative data and information using a range of appropriate media.
- CH12-5 Analyses and evaluates primary and secondary data and information.
- CH12-6 Solves scientific problems using primary and secondary data, critical thinking skills and scientific processes.
- CH12-7 Communicates Scientific understanding using suitable language and terminology for a specific audience or purpose.
- CH12-13 describes, explains and quantitatively analyses acids and bases using contemporary models.

### Task Description/Overview

This is a Practical and Problem-Solving Task – including a First Hand Investigation (Titration) and scientific report.

You are to devise a method using acid-base titration to calculate the acid content of the juice, conduct the experiment, and present the findings in a Scientific Report.

The experiment will be conducted individually, not in groups. Each person is to have a different juice.

## Detailed Assessment Task Description

**Task Instructions:**
You are to devise a method using acid-base titration to calculate the acid content of the juice, conduct the experiment, and present the findings in a Scientific Report.

You will be provided with the following:
0.1 M solution of NaOH
1 x 500 mL conical flask
Deionised water
Burette and retort stand
Phenolphthalein indicator
KHP
Volumetric Flasks
Electronic balances
Burette clamps

Other equipment is allowed, however, it must be requested.

**Note:**
You will have to first make a primary standard of Potassium hydrogen phthalate KHP($C_8H_5KO_4$) to standardise your sodium hydroxide titrant.

**Report:**
You will complete a fill Scientific report on your experiment, including all calculations used in the experimental part. Photos, comments, data etc. may be included.

Include the following sections:

- Title
- Introduction
- Aim
- Hypothesis
- Equipment List
- Risk Assessment
- Method
    - Controlled Variables
- Scientific diagrams (hand draw on using an online program such as https://chemix.org/ )
- Results
    - Data/calculations
    - Graph(s) if applicable
- Discussion
    - Interpretation of results
    - Accuracy, Validity and Reliability analysis
- Conclusion
- References

Key points to address

Address the following key points in your report. This is best done such that the questions are answered in the report itself, but some can be answered separately at the end of the report.

- Identify how your burette, pipette(s), volumetric flask and conical flask(s) were washed before use.
- Explain why you chose the indicator(s) that you used.
- Describe what 'end point' and 'equivalence point' mean and the difference between the two (if applicable).
- Include balanced chemical equations for all reactions.
- Describe the properties of a primary standard and explain why they are important.
- Use correct units and states.

You have the option of using digital technologies (pH probes, drop counters, conductivity probes) as part of this experiment.

There is a word limit of 5000 words. Marks will be deducted if you exceed this.
Total Marks: 70

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| Weeks 2-3 | Receive notification<br>Researching and planning at home |
| Week 4 | **Notify Mrs. Stoker in writing of what juice from Woolworths you want.** If you do not submit this in time you will need to buy your own.<br>Planning at home. Writing your own Aim – Method and Results tables |
| Week 6 | Planning at home. Writing your own Aim-Method and results tables<br>Risk Assessment Checked<br>Preparing Standard Solutions in the laboratory |
| Week 7 | Conducting Titration |
| Week 8 | Conducting Experiment (only if needed)<br>Finalising Scientific Report write-up |
| Week 9 | **Submit via canvas by 8:25 am Thursday, June 27** |

Marking Criteria Practical Assessment

| **Marking Criteria – Practical Skills (Will be observed in class time when conducting the experiment)** | | | | |
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| 4 | 3 | 2 | 1 | Comment |
| Demonstrates an extensive ability to identify and set up the most appropriate equipment and carry out the first-hand investigation *[Link: CH11/12-2]* | Demonstrates a thorough ability to identify and set up appropriate equipment and carry out the first-hand investigation [Link: CH11/12-2] | Demonstrates a sound ability to identify and set up appropriate equipment and carry out the first-hand investigation [Link: CH11/12-2] | Demonstrates an elementary ability to identify and set up appropriate equipment and carry out the first-hand investigation [Link: CH11/12-2] | |
| | Demonstrates an extensive ability in identifying and addressing all potential hazards and chemical disposal requirements and using safe work practices during the investigation [Link: CH11/12-3] | Demonstrates a thorough ability in identifying and addressing most potential hazards and chemical disposal requirements and using safe work practices during investigation [Link: CH11/12-3] | Demonstrates a sound ability in identifying and addressing some potential hazards and chemical disposal requirements and using safe work practices during investigation [Link: CH11/12-3] | |
| | Demonstrates an extensive ability in measuring, observing and recording results in accessible and recognisable forms, carrying out repeat trials as appropriate [Link: CH11/12-4] | Demonstrates a thorough ability in measuring, observing and recording results in accessible and recognisable forms, carrying out repeat trials as appropriate [Link: CH11/12-4] | Demonstrates a thorough ability in measuring, observing and recording results in accessible and recognisable forms, carrying out repeat trials as appropriate [Link: CH11/12-4] | |
| Comment: | | | | /10 |

| Scientific Report Marking Criteria | | | | | |
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| Criteria | 5 | 4 | 3 | 2 | 1 |
| Title and Aim<br>CH12-7 | | | Clear title and aim which describes what the experiment is designed to test. | Basic title and aim which outlines what the experiment is designed to test. | Unclear Title and aim. Does not adequately describe what the experiment is designed to test.<br>E.g. Transpiration Experiment. |
| Introduction<br>CH12-7 | Identifies & Explains the nature of the problem the experiment is designed to investigate. Includes detailed, clear and relevant information. Analysis and synthesis of the main ideas from the literature are integrated and linked to the investigation. Justifies the hypothesis related to current facts or theories. | Identifies & Explains the nature of the problem the experiment is designed to investigate. Includes clear and relevant information. Justifies hypothesis related to current facts or theories. | Identifies the nature of the problem the experiment is designed to investigate, and some explanation provided. Most information is clear and relevant. | The introduction is very brief, giving some background information. Minimal explanation of what the experiment is designed to investigate.<br>Or<br>Includes significant amounts of irrelevant information | The introduction is very brief. It does not give background information and shows a limited understanding of the topic being investigated. It may include irrelevant or incorrectly interpreted information. |
| Hypothesis<br>CH12-1 | | | The hypothesis is correctly stated. A clear statement of prediction regarding the acid concentration | A statement of prediction of the concentration of acid in the juice is made | Poorly worded hypothesis. May not have considered research. |
| Materials and Equipment<br>CH12-2 | | | Identifies the most appropriate equipment needed to undertake the investigation. Comprehensive list of materials and equipment including sizes and quantities. Diagram is neatly drawn and accurately labelled. | Acceptable materials used. Complete list of materials and equipment, may lack some information such as units and quantity. Diagram is neatly drawn with most labels. Or Labelled correctly but diagram not drawn scientifically. | Choice of materials poor<br>OR<br>Incomplete list of materials and equipment. If included, diagram is poorly drawn e.g. without a ruler and inadequately labelled. |
| Risk Assessment<br>CH12-2 | | | Thorough, excellent risk assessment covering all necessary equipment and chemicals. | Risk Assessment sound. | Risk assessment in incomplete. |

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| **Method**<br>CH12-2<br>CH12-7<br>CH12-13 | Appropriate method—well written & thorough. The method is written so that it could be repeated exactly by another person without prior knowledge of the experiment. Written in third person, past tense. Correct washing procedures are outlined. | Appropriate method—well written although some minor details are missing. Written in third person, past tense. Correct washing procedures are outlined. | Satisfactory method—minor details missing. May be difficult for another person to repeat without consultation. May not be written in third person, past tense. | Method is missing information. Units and or quantities may be incorrect or absent. May not be written in third person, past tense. | Method is poorly written with sections missing. Could not be accurately repeated by someone else. Written in first person. |
| **Variables**<br>CH12-2 | | | Correctly identifies at least 3 controlled variables and justifies why/how they were controlled. | Correctly identifies controlled variables with some justification. | Identifies controlled variables. |
| **Results**<br>CH12-3<br>CH12-13 | Results are presented in well-designed tables, graphs and figures. All data is accurately recorded. All working out is shown. The correct number of significant figures is used. | Presentation of results is clear, but there are some minor omissions. Most working out is shown. Calculations are correct. | Data is complete and correctly recorded. Some omissions in working out or recording of data. | Data is displayed in a table with components missing &/or errors in calculations. | Data is poorly displayed and unorganised. Have only given raw data. Significant omissions e.g. missing units, headings, labels etc. |
| **Discussion (validity and reliability)**<br>CH12-3 | Outstanding assessment of validity and reliability. Uses quantitative data and refers to any possible errors that occurred during the experiment. | A thorough assessment of the validity and reliability. | Sound information assessment of the reliability and/or validity of the method. | Basic information about the reliability and/or validity of the method. | Limited information about the reliability and/or validity of the method. |
| **Discussion (Accuracy)**<br>CH12-3 | Outstanding assessment of the procedures and equipment undertaken and used to ensure the accuracy of the results. Related it back to reducing errors. | A thorough assessment | Sound assessment | Basic information about accuracy. | Limited information about accuracy. |
| **Conclusion**<br>CH12-5 | | | | An acceptable conclusion is drawn that correctly states how the hypothesis has been supported or refuted. | Conclusion poorly stated. Does not state if the hypothesis was supported or refuted. |

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| **Key Points**<br>CH12-7 | All six key points addressed either on their own or within the report | At least five of the key points addressed correctly, either on their own or within the report | At least four of the key points addressed correctly, either on their own or within the report | At least three of the key points addressed correctly, either on their own or within the report | Only one or two of the key points addressed correctly, either on their own or within the report |
| **References**<br>CH12-4 | | Provides an accurate reference list using the appropriate referencing style including text referencing. | Provides an accurate reference list using the appropriate referencing style | Provides a limited reference list | Provides and inaccurate reference list |
| **Overall Experimental Design**<br>CH12-13 | | Design is thorough and detailed, to achieve aim, enables fair & valid testing, and procedures are safe. | Design is appropriate to achieve aim, enables fair & valid testing, and procedures are safe. | Design is acceptable with minor weaknesses, enables reasonably fair and valid testing, and procedures are safe. | Design has several weaknesses, limits ability to achieve aim and/or leads to invalid data/results. Procedures are safe. |
| **Overall Presentation**<br>CH12-7 | Report is set out neatly in a clear and logical order with headings and subheadings. Ideas are coherently expressed with correct sentence structure, grammar and spelling. Sophisticated language used. Correct scientific terminology used. Report is written in past tense, third person. Does not exceed 5000 words. | Report is clearly set out. Ideas are expressed with correct sentence structure. Use of scientific language. Minimal grammatical & spelling errors. Report is written in third person, past tense. | Report is clearly set out. Some grammatical and spelling errors. Sections of report may not be written in past tense, third person. | Report formatting is basic. Basic use of scientific language. Contains grammatical and spelling errors. May not be written in third person/past tense. | Report is poorly set out. Minimal use of scientific language. Contains multiple grammatical and spelling errors. May not be written in past tense, third person. |

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| Comment | /70 |

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| **Assessment Criteria** | | |
| **Grade** | **Description** | **Mark Range** |
| **Outstanding (O)** | The student has an extensive knowledge and understanding of the content and can readily apply this knowledge. In addition, the student has achieved a very high level of competence in the processes and skills and can apply these skills to new situations. | **84.5-100%** |
| **High (H)** | The student has a thorough knowledge and understanding of the content and a high level of competence in the processes and skills. In addition, the student is able to apply this knowledge and these skills to most situations. | **69.5-84%** |
| **Sound (S)** | The student has a sound knowledge and understanding of the content and has achieved a good level of competence in the processes and skills. | **49.5- 69%** |
| **Basic (B)** | The student has a basic knowledge and understanding of the content and has achieved a basic level of competence in the processes and skills | **27.5-49%** |
| **Limited (L)** | The student has an elementary knowledge and understanding in a few areas of the content and still requires further work to achieve competence in the processes and skills. | **0-27%** |

## Satisfactory completion of courses

A course has been satisfactorily completed, when the student has:

- Followed the course developed/endorsed by the NSW Educational Standards Authority (NESA)
- Applied himself/herself with diligence and sustained effort to the set tasks and experiences provided in the course.
- Achieved some or all of the course outcomes