ORANGE HIGH SCHOOL

ASSESSMENT TASK NOTIFICATION

Subject	Chemistry
Year	11 (Preliminary)
Weighting	30%
Teacher	Mr Routh
Head Teacher	Mr Shea
Date given	Friday the 20th of March 2020 – Week 8A Term 1
Date and school week	Tuesday the 5th of May 2020 – Week 2B Term 2

Assessment Outline

PART 1 – Planning and conducting a scientific investigation to gather data (in groups)

- To complete this task, you are required to plan and perform a scientific investigation to calculate the percentage composition of a mixture. Students will plan the investigation in groups during Week 8/9.
- The practical investigation will be performed in class time during the double period on Monday Week 10.

PART 2 – Formal investigation report (individually)

- Students will then be required to analyse and interpret the data collected from the scientific investigation and present it in the format of a formal written scientific report (see provided scaffold).
- Students will be required to answer a series of questions as part of their analysis (see attached discussion guide sheet).
- Students must include their calculations as an appendix.

Non-completion of Task:

If you know you are going to be away on the day that the task is due, you must make alternative arrangements with your classroom teacher. If you are away on the day of the examination, you must catch up with your classroom teacher on the first day you return to make alternate arrangements to catch up on this task.

Failure to follow the above procedures may result in a zero award.

Outcomes Assessed

CH11 – 1 Develops and evaluates questions and hypotheses for scientific investigation
CH11 – 2 Designs and evaluates investigations in order to obtain primary and secondary data and information
CH11 – 3 Conducts investigations to collect valid and reliable primary and secondary data and information
CH11 – 5 Analyses and evaluates primary and secondary data and information
CH11 – 7 Communicates scientific understanding using suitable language and terminology for a specific audience or purpose
CH11 – 8 Explores the properties and trends in the physical, structural and chemical aspects of matter

Year 11 Chemistry Assessment Task 1

PRACTICAL FIRST-HAND INVESTIGATION

Weighting: 30%

Module 1:

Due Date: Tuesday the 5th of May 2020 – Week 2B Term 2

Task Overview:

This task contains two parts.

PART 1 – Planning and conducting a scientific investigation to gather data (in groups)

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The practical investigation will be performed in class time during the double period on Monday Week 10.

PART 2 – Formal investigation report (individually)

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Syllabus Outcomes:

CH11 – 1 Develops and evaluates questions and hypotheses for scientific investigation
CH11 – 2 Designs and evaluates investigations in order to obtain primary and secondary data and information
CH11 – 3 Conducts investigations to collect valid and reliable primary and secondary data and information
CH11 – 5 Analyses and evaluates primary and secondary data and information
CH11 – 7 Communicates scientific understanding using suitable language and terminology for a specific audience or purpose
CH11 – 8 Explores the properties and trends in the physical, structural and chemical aspects of matter

Content:

Students:

- Develop a method most appropriate to test a hypothesis following observation
- Justify the type of methodology used to test the hypothesis
- Conduct the planned investigation and collect, record and analyse primary data
- Draw a conclusion or conclusions, and suggest further investigation or research by:
  – analysing the results and interpreting the data
  – explaining the relevance of the findings of the investigation in relation to the inquiry question and hypothesis
- Evaluate the validity of the investigation by determining whether the tests measured what they were intended to measure
- Explore homogeneous mixtures and heterogeneous mixtures through practical investigations:
  - using separation techniques based on physical properties
  - calculating percentage composition by weight of component elements and/or compounds
- Classify the elements based on their properties and position in the periodic table through their:
  - physical properties
  - chemical properties

Practical details:

You will be supplied with a sample of a mixture. This mixture contains the following elements and compounds.

- Copper Sulphate ($CuSO_4.5H_2O$)
- Copper Carbonate ($CuCO_3$)
- Silicon Dioxide (SiO_2)
- Iron Filings (Fe)

Using your Knowledge and available resources, determine methods that could be used to separate the mixture into four (4) individual components. As part of your report, you will need to explain the methods used for separation of the compounds and elements from the mixture and the link to the elements physical properties.

The experimental report should be written in the correct format and contain all relevant sections and data as per the scaffold supplied.

As part of the report, the percentage composition of the Fe (iron filings), SiO_2 (sand) $CuSO_4$ (copper sulphate) and $CuCO_3$ (copper carbonate) need to be determined. Thought will also need to be given to the method of separation between the sand and the Copper Carbonate which are both insoluble. Keep in mind that the $CuCO_3$ does not need to be kept for future use so could be destroyed during the process of separation and analysis.

<u>Equipment provided:</u>

The following lists all of the pieces of equipment that you will have access to in order to successfully complete the separation.

- Beakers
- Flasks
- Funnels
- Filter paper
- Tripod/gauze
- Magnet
- Stirring rods
- Evaporating basins
- Bunsen burner
- 4M nitric acid
- electronic scales

Conduct the practical in class (Monday, Week 10, Term 1) and then write up your experimental report as outlined in the scaffold provided.

Scientific Report Writing Scaffold:

To write your formal scientific report you must include the following:

Abstract - An abstract summarises, usually in one paragraph of 300 words or less, the major aspects of the entire report in a prescribed sequence that includes (complete this last, once the report is complete):

1) The overall purpose of the study and the research problem(s) you investigated;
2) The basic design of the study;
3) Major findings or trends found as a result of your analysis; and,
4) A brief summary of your interpretations and conclusions.

Aim – What was the purpose of the investigation?

Background information – A paragraph that informs the reader of the science behind the investigation you are undertaking. This must be detailed and should include information about the chemistry involved. For example, using a biology growth experiment (content is not relevant for this task), if you were to conduct an investigation to prove that increasing the amount of water given to a plant would allow the plant to have maximum growth (total height and mass). You would include any information relevant to your investigation in this section, such as the effect of water on plant growth, what nutrients do plants need to grow and how light affects the growth of plants during the process of photosynthesis would have on your investigation, and include any information that would influence your experimental design (method).

Hypothesis - A tentative explanation for an observed phenomenon, expressed as a precise and unambiguous statement that can be supported or refuted by investigation.

Equipment list – a detailed list of all equipment used to perform the investigation.

Variables Identified – Indicate which variables you are going to control in the investigation (kept the same)

Risk Assessment – Students are to conduct a risk assessment of the investigation. At least 3 risks should be included, and three control measures. The risk assessment should be presented as a table. (see below)

Risk:	**Control Measure:**
Risk 1	
Risk 2	
Risk 3	

Method – Individually create a method to conduct the investigation. You must include the method in your report. It should be in step form, provide clear logical instructions, include how/what equipment is used to collect the data, and include repetition.

Results (table) - first-hand data should be presented in an appropriate table. All tables should be labelled.

Results (graphs) – Make sure that your graphs have appropriate heading, labels on the axis, even scales, and appropriate units. You may draw your graphs using a computer program (excel) or by hand. All graphs should be labelled.

Discussion - This is the section in which you analyse your results. Your discussion should have at least 4 sections.

Section 1: This is the section in which you interpret your results. You should refer directly to the data that was gathered and analyse it using your graph. You should look for trends and discuss why they have occurred. You can link this to your background research to further indicate your understanding of why this trend has occurred.

Section 2: This is the section in which you analyse the accuracy and precision of the data you collected. It is a good idea to give a definition of each term before you start discussing how your investigation performed. You also need to make sure that you provide evidence (specific examples) of how your

investigation was/wasn't accurate or precise. You should also include how you could improve the investigation to increase accuracy and precision.

Section 3: This is the section in which you analyse the reliability of the data you collected. It is a good idea to give a definition of the term before you start discussing how your investigation performed. You also need to make sure that you provide evidence (specific examples) of how your investigation was/wasn't reliable. You should also include how you could improve the investigation to increase reliability.

Section 4: This is the section in which you analyse the validity of the data you collected. It is a good idea to give a definition of the term before you start discussing how your investigation performed. You also need to make sure that you provide evidence (specific examples) of how your investigation was/wasn't valid. You should also include how you could improve the investigation to increase validity.

Conclusion – A paragraph summarising the main findings of the investigation. A concluding paragraph should refer to the aim of the investigation and state whether the hypothesis was proven or disproved, and the consequences/implications of this. You conclusion may identify an area of potential future research based on your investigation. You conclusion should always be based on evidence and refer directly to evidence from your investigation.

Reference list – This is where you include any references that you used/referred to in your investigation. You should try to use references in your background information section and in your discussion.

Appendix/appendices – An appendix is always included in a scientific investigation. An appendix is where you include any calculations (if any) that you made during your investigation, any additional data that you collected, your raw data collected in the investigation (this is where you put your messy table from when you actually conducted the investigation), any additional data manipulation that isn't required in the main results section. You can also include picture of your investigation set up and final products.

Discussion question guide sheet

(use these to support the development of your discussion)

Section 1: This is the section in which you interpret your results.

1. What trends can you see in your graphs?

2. What were the percentage compositions of each component of the mixture.

3. Discussion how the percentage components of the mixture were separated.

4. Describe any links between your results and your background research (This should be at least **TWO** paragraphs, where you connect scientific information to your results).

Section 2: This is the section in which you analyse the accuracy and precision of the data you collected.

1. Define the terms accuracy and precision.

2. Describe if your results have a high level of accuracy.

3. Analyse the equipment that you used in this investigation and describe any equipment that you could have used to improve the accuracy of this investigation.

4. Analyse the method/techniques that you used in this investigation and describe how you would improve the method/techniques used.

Section 3: This is the section in which you analyse the reliability of the data you collected.

1. Define the term reliability.

2. How many times did you repeat this investigation?

3. Describe if your results have a high level of reliability.

4. Describe how you could improve the reliability of this investigation.

Section 4: This is the section in which you analyse the validity of the data you collected.

1. Define the term validity.

2. Does your experimental method actually achieve testing your hypothesis? Discuss.

3. Is your investigation valid? Discuss.

4. How could you improve the overall validity of this investigation?

<u>Marking Rubric:</u> Practical first-hand investigation **NAME: _____**

Criteria: (mark)	Outstanding (A)	High (B)	Sound (C)	Basic (D)	Limited (E)
1. **Title and Aim**	• Sophisticated title given (uses scientific language), detailed scientific aim given **3 marks**		Interesting title given and a scientific aim given **2 marks**		Simple title given and aim given **1 mark**
2. **Background Information**	• Clear explanation of the project. • Detailed and sophisticated explanation of the topic area of study. • 4 or more relevant pieces of scientific information given. At an extensive level. **5 marks**	Clear explanation of project. Detailed explanation of the topic area of study. 4 relevant pieces of information given. At a thorough level. **4 marks**	Explanation of project given. Explanation of topic area of study. 3 relevant pieces of information given. At a sound level. **3 marks**	Explanation of project. Basic explanation of the topic area. Less than 2 pieces of information given. At basic level. **2 marks**	Explanation of project given. No scientific information present. At elementary level. **1 mark**
3. **Hypothesis**	• Predict what you think will happen. • High use of scientific terms • **If** and **Then** statement could be used (No use of "I" or "we".) **3 marks**		Any two of the previous points **2 marks**		Any one of the previous points **1 mark**
4. **Controlled variables in the investigation**	• Controlled variables – correct (4 or more) • Detailed explanation of why they need to be controlled • Scientific language used • At an extensive level. **4 marks**		Any 3 of the previous at high level. **3 marks**	Any 2 of the previous at basic level. **2 marks**	Any 1 of the previous at elementary level. **1 mark**
5. **Equipment list**	• Sophisticated and completed list of all equipment used **3 marks**		List of most of the equipment used **2 marks**		Simple list of some of the equipment used **1 mark**
6. **Safety**	List all safety issues (3 or more) with conducting the investigation Explain how each issue was solved or reduced At an extensive level. **5 marks**	List all safety issues (3 or more) with conducting the investigation Explain how each issue was solved or reduced At a thorough level. **4 marks**	List some safety issues (2) with conducting the investigation Explain how each issue was solved or reduced At a sound level. **3 marks**	List some safety issues (2) with conducting the investigation Attempts to explain how each issue was solved or reduced At a basic level. **2 marks**	List some safety issues (1) with conducting the investigation Attempts to explain how issue was solved or reduced At an elementary level. **1 mark**

7. **Method**	• Clear and logical method in third person • Need to be in correct order, detailed and in numbered steps • Include how the dependent variable will be measured, along with any other variables • Include how many times the experiment will be repeated • Scientific terms used and at an extensive level. No use of "I" or "we". (past tense) **5 marks**	Any 4 of the previous at thorough level. No use of "I" or "we". **4 marks**	Any 3 of the previous at high level. **3 marks**	Any 2 of the previous at basic level. **2 marks**	Any 1 of the previous at elementary level. **1 mark**
8. **Results - Table**	• Presented in an appropriate table • Has appropriate headings and correct units • No units present on the data in the table (in heading only) • Averages included and correct • Neatly presented and at an extensive level (is enclosed and has been drawn with ruler). **5 marks**	Any 4 of the previous at thorough level. **4 marks**	Any 3 of the previous at high level. **3 marks**	Any 2 of the previous at basic level. **2 marks**	Any 1 of the previous at elementary level. **1 mark**
9. **Results - Graph**	• Presented in an appropriate graph for the data collected • A line of best fit is correctly present • Axis' are labelled correctly • Units included on the correct axis' • Data plotted correctly and at an extensive level (use of x to plot data points). **5 marks**	Any 4 of the previous at thorough level. **4 marks**	Any 3 of the previous at high level. **3 marks**	Any 2 of the previous at basic level. **2 marks**	Any 1 of the previous at elementary level. **1 mark**
10. **Discussion – Section 1**	• A summary of the main findings of the investigation given, including trends. • Results are interpreted and specific examples from the data given • Results link to background research on the topic. • Real world applications discussed for the results? • Scientific terms used and at an extensive level. **5 marks**	Any 4 of the previous at thorough level. **4 marks**	Any 3 of the previous at high level. **3 marks**	Any 2 of the previous at basic level. **2 marks**	Any 1 of the previous at elementary level. **1 mark**
11. **Discussion – Section 2**	• A judgement about the accuracy of the investigation is given. • Explanation of what makes an investigation (any) accurate? • Specific examples from the investigation to support the assessment of the accuracy of the results given. • Scientific terms used and at an extensive level. • How could you improve the accuracy of the investigation? **5 marks**	Any 4 of the previous at thorough level. **4 marks**	Any 3 of the previous at high level. **3 marks**	Any 2 of the previous at basic level. **2 marks**	Any 1 of the previous at elementary level. **1 mark**

12. **Discussion – Section 3**	• A judgement about the reliability of the investigation is given. • Explanation of what makes an investigation (any) reliable? • Specific examples from the investigation to support the assessment of the reliability of the results given. • Scientific terms used and at an extensive level. • How would improve the reliability of the investigation? **5 marks**	Any 4 of the previous at thorough level. **4 marks**	Any 3 of the previous at high level. **3 marks**	Any 2 of the previous at basic level. **2 marks**	Any 1 of the previous at elementary level. **1 mark**
13. **Discussion – Section 4**	• A judgement about the validity of the investigation given. Was it a fair test? • Explains if investigation is valid? What makes an investigation valid? • Explains what variables are controlled and how they were controlled • Problems with the investigation discussed and linked to its validity • Specific examples from the investigation to support the assessment of the validity of the results and scientific terms used and at an extensive level. **5 marks**	Any 4 of the previous at thorough level. **4 marks**	Any 3 of the previous at high level. **3 marks**	Any 2 of the previous at basic level. **2 marks**	Any 1 of the previous at elementary level. **1 mark**
14. **Conclusion**	• Summary statement of the main results from the investigation. • How did the independent variable affect the dependent variable? • Examples given from results. • Explains if results support or disprove the hypothesis? • Scientific terms used and at an extensive level. **5 marks**	Any 4 of the previous at thorough level. **4 marks**	Any 3 of the previous at high level. **3 marks**	Any 2 of the previous at basic level. **2 marks**	Any 1 of the previous at elementary level. **1 mark**
15. **Report – Overall Presentation**	• Reference list present and correct (10 or more sources used) • Minimal spelling, punctuation and grammatical errors (2-3) • Appendix supplied and correct • Follows report format extensively **5 marks**	Reference list present 8 or more sources. 4-7 errors. **4 marks**	Reference list present 6 or more sources. 8-10 errors. **3 marks**	Reference list present 3 sources. 11-12 errors. **2 marks**	No Reference list present. More than 13 errors. **1 mark**

Outcomes					
CH11 – 1 (Sections 1,2,3) **= 11**	**CH11 – 2 (Sections 4,5,6,7)** **= 17**	**CH11 – 3 (Sections 8,9)** **= 10**	**CH11 – 5 (Sections 10,11)** **= 10**	**CH11 – 7 (Sections 15)** **= 5**	**CH11 – 8 (Sections 12,13,14)** **= 15**
Total = 68					
Total Grade	**A 68 – 60**	**B 59 – 50**	**C 49 – 20**	**D 19 – 9**	**E 8 – 0**

Feedback

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