**2023**

**Year 12 Earth and Environmental Science – Unit 3**

**Task 1: Ore Extraction Investigation**

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| **Assessment Type:** |  | Name: |  |
| Investigation |  |
| **Duration & Conditions:**  3 lessons, practical and |  | Teacher: |  |
| individual work |  |  |  |
| **Assessment weighting:**  6 % of year mark |  | Date: |  |

|  |  |
| --- | --- |
| **Section** | **Marks** |
| **Part 1: Research** |  |
| **Part 2: Scientific Reports** |  |
| **Total Mark** |  |

*I acknowledge that all the information contained in this task is my own work and not taken from other sources. If other sources have been used they have been acknowledged in my references.*

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(Student Signature)

*Please see SEQTA for teacher feedback and comments.*

**Task:**

Your task for this assessment is to research two different metal extraction methods, and then apply these methods for in-class copper ore extraction.

Once you have completed both research and the experiments, you will need to write a scientific report for each experiment, including a description of the procedure, labelled diagram of the equipment setup, observations, and a description of the safety precautions.

You will also need to include a word equation for the chemical reaction taking place.

**Part 1: Research**

Conduct research on how metals are extracted from their ores by industry, and how the process is adapted when used on a large industrial scale.

* Describe the process for extracting one of the following: Copper, Iron, Lead, Tin, or Zinc from its ore using reduction.
* Describe the process for extracting one of the following: Aluminium or Magnesium from its ore using electrolysis.
* Describe any pollution problems that need to be tackled by industry during these two extraction processes.

**Part 2: Scientific reports**

**Electrolysis report**

This process (electrolysis or electrowinning) is used to recover metals such as copper and uranium which are extracted from the ore body by in-situ leaching (ISL). This form of extraction is used in the Beverley and Honeymoon uranium mines in South Australia.

Your task during this activity will be to prepare and use electrolysis equipment to extract Copper ore from a Copper (II) sulfate solution.

You need to:

* Using the experiment outline provided, write a procedure in your own words on how to complete the experiment.
* Draw a labelled diagram of your equipment setup
* Explain your observations of what resulted from the experiment
* Describe the safety precautions taken
* Write a word equation for the chemical reaction taking place.

**Ore Reduction report**

Your task during this activity will be to prepare and use a miniature blast furnace to extract a metal from its ore. You will extract copper from Copper (II) oxide using carbon reduction.

You need to:

* Using the experiment outline provided, write a procedure in your own words on how to complete the experiment.
* Draw a labelled diagram of your equipment setup
* Explain your observations of what resulted from the experiment
* Describe the safety precautions taken
* Write a word equation for the chemical reaction taking place.

**Part 1: Research**

Describe the process for extracting one of the following: Copper, Iron, Lead, Tin, or Zinc from its ore using reduction.

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Describe the process for extracting one of the following: Aluminium or Magnesium from its ore using electrolysis.

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Describe any pollution problems that need to be tackled by industry during these two extraction processes.

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**Part 2: Scientific Reports**

**Electrolysis report**

In your own words, write out a procedure of how the experiment was conducted.

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Draw a labelled diagram of the equipment setup.

What did you observe during the experiment? What do these observations mean?

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Describe the safety precautions that were adhered to during the experiment.

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Write a word equation for the chemical reaction that occurred during the experiment.

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**Carbon Reduction report**

In your own words, write out a procedure of how the experiment was conducted.

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Draw a labelled diagram of the equipment setup.

What did you observe during the experiment? What do these observations mean?

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Describe the safety precautions that were adhered to during the experiment.

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Write a word equation for the chemical reaction that occurred during the experiment.

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**END OF ASSESSMENT**

**MARKING KEY:**

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| --- | --- | --- | --- | --- |
| **Part 1: Research** | **4** | **3** | **2** | **1** |
| Describes process of reduction | Metal extraction from ores using reduction is described in a clear and logical sequence. | | Only a basic description of the metal extraction process using reduction is included. | |
| Describes process of electrolysis | Metal extraction from ores using electrolysis is described in a clear and logical sequence. | | Only a basic description of the metal extraction process using electrolysis is included. | |
| Describes industrial scale waste and pollution problems | Identifies waste products of extraction processes and how cleaner emissions are produced at industrial scale. | | Has not identified waste products of metal extraction processes and/or does not include description of industrial scale emissions | |
| **Parts 2 & 3: Scientific Reports** | **4** | **3** | **2** | **1** |
| Includes method | Includes clear and complete methods used for in-class practical | | Methods included are either unclear or incomplete | |
| Includes experimental diagrams | Includes clear, correctly labelled diagram of apparatus. | | Diagram is included but unclear or unlabelled | |
| Includes observations |  | | Includes clear and detailed series of observations | |
| Includes chemical reaction and word equations | Description of chemical changes that occur during the process is clear and complete, includes word chemical equations | | Description of chemical changes that occur during the process is unclear or incomplete, does not includes word chemical equations | |