Additional Assessment Materials
Summer 2021

Pearson Edexcel GCSE in Chemistry (1CH0)
Foundation

Resource Set Topic G: Extracting metals and equilibria

Questions

(Public release version)

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General guidance to Additional Assessment Materials for use in 2021

Context
- Additional Assessment Materials are being produced for GCSE, AS and A levels (with the exception of Art and Design).
- The Additional Assessment Materials presented in this booklet are an **optional** part of the range of evidence teachers may use when deciding on a candidate's grade.
- 2021 Additional Assessment Materials have been drawn from previous examination materials, namely past papers.
- Additional Assessment Materials have come from past papers both published (those materials available publicly) and unpublished (those currently under padlock to our centres) presented in a different format to allow teachers to adapt them for use with candidate.

Purpose
- The purpose of this resource to provide qualification-specific sets/groups of questions covering the knowledge, skills and understanding relevant to this Pearson qualification.
- This document should be used in conjunction with the mapping guidance which will map content and/or skills covered within each set of questions.
- These materials are only intended to support the summer 2021 series.

9 Most metals are extracted from ores found in the Earth's crust.

The method used to extract a metal from its ore is linked to the reactivity of the metal.

Part of the reactivity series is shown in Figure 14.

calcium   most reactive

aluminium

zinc

iron

copper

gold   least reactive
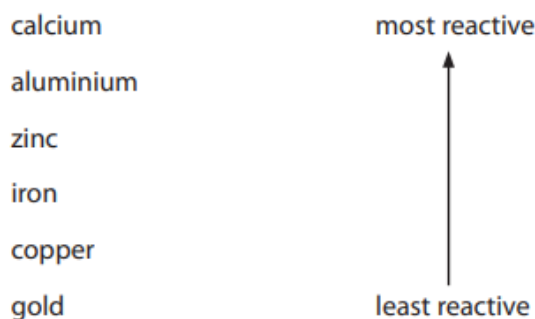
Figure 14

(a) Iron ore contains iron oxide.

Iron is extracted from iron oxide by heating the oxide with carbon.

$$\text{iron oxide} + \text{carbon} \rightarrow \text{iron} + \text{carbon dioxide}$$

(i) In this reaction

(1)
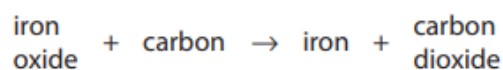
☒ **A** carbon is reduced

☒ **B** iron oxide is neutralised

☒ **C** iron oxide is reduced

☒ **D** iron is oxidised

(b) Aluminium cannot be extracted by heating its oxide with carbon.
Aluminium has to be extracted from its oxide by electrolysis.

Explain why.

(2)

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(c) Predict the method that will have to be used to extract calcium from its ore.

(1)

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*(d) Aluminium is extracted from its ore by electrolysis.
Iron is extracted from its ore by heating with carbon.
Both metals can also be obtained by recycling.

Explain the advantages of recycling aluminium and iron rather than extracting
them from their ores.

(6)

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5 (a) The reactivity of copper, magnesium and zinc was investigated.
Each metal was placed separately in dilute hydrochloric acid.
The amount of effervescence was observed.

(i) The same mass of metal was used in each experiment.
Which piece of apparatus should be used to find the mass of metal used?

(1)

☒ **A** a balance

☒ **B** a pipette

☒ **C** a stopwatch

☒ **D** a thermometer

(ii) State **two** variables, apart from the mass of the metals, that should be controlled in this investigation.

(2)

1 ....

....

2 ....

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(iii) Magnesium produces the most vigorous effervescence.
Copper does not produce any effervescence.

Give the reason why copper does not produce any effervescence.

(1)

....

6 Metals are extracted from substances naturally occurring in the Earth's crust.

(a) Which of these metals is usually found uncombined in the Earth's crust?

(1)

☒ **A** calcium

☒ **B** gold

☒ **C** iron

☒ **D** magnesium

(b) Zinc can be extracted by heating zinc oxide with carbon.

The products are zinc and carbon dioxide.

(i) Write the word equation for this reaction.

(2)

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(ii) In this reaction zinc oxide loses oxygen.

State the type of reaction taking place when an oxide loses oxygen.

(1)

....

(c) Aluminium is extracted from aluminium oxide by electrolysis.
Aluminium oxide is made up of ions.

(i) The formula of aluminium oxide is Al_2O_3.

Give the number of ions in the formula Al_2O_3.

(1)

....

(ii) Complete the balanced equation for the overall reaction by putting numbers
in the spaces.

(2)

$$2Al_2O_3 \rightarrow \text{.............. } Al + \text{.............. } O_2$$

(d) (i) The environmental impact of a product is assessed in a life-cycle assessment.

The stages in this assessment are given below.
They are not in the correct order.

A disposal of the product
B manufacturing the product
C obtaining and processing the raw materials
D using the product

List the stages of the life-cycle assessment, using letters **A**, **B**, **C**, **D**, in the correct order from start to finish.

(2)

(ii) Aluminium can be obtained by recycling aluminium waste.

Give **two** advantages of obtaining aluminium by recycling aluminium waste rather than mining the raw material and extracting aluminium from that raw material.

(2)

1 ....

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2 ....

....

6 Some metals are found in the Earth's crust as uncombined elements.
Reactive metals are found in ores.

In ores, metals are combined with other elements.

(a) Which of these metals is found as the uncombined element in the Earth's crust?

(1)

☒ **A** aluminium

☒ **B** gold

☒ **C** potassium

☒ **D** zinc

(b) Give **two** advantages of recycling metals rather than extracting metals from their ores.

(2)

1 ....

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2 ....

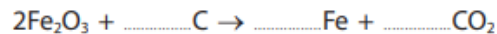..

(c) An ore of iron is mostly iron oxide, Fe_2O_3.
Iron can be extracted from this iron oxide by heating it with carbon.

Balance this equation for the reaction that takes place.

(1)

$$2Fe_2O_3 + \text{..........}C \rightarrow \text{..........}Fe + \text{..........}CO_2$$

(d) Most copper ores are described as low grade.
This means that the percentage of copper in the ore is very small.

5000 kg of one copper ore was found to contain 42.5 kg of copper.

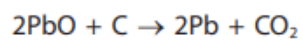Calculate the percentage of copper in this ore.

(2)

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....

percentage of copper in ore = ...

(e) In one stage of the extraction of lead from its ore, lead oxide is heated strongly with carbon.

The equation for the reaction is

$$2PbO + C \rightarrow 2Pb + CO_2$$

Explain, using this equation, which substance has been oxidised in this reaction.

(2)

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TOTAL FOR PAPER IS 33 MARKS