

Name:

Date:

C10 - Test 4
USING RESOURCES
Intermediate

GCSE

CHEMISTRY

AQA - Triple Science

Mark

Grade

Materials

For this paper you must have:

- Ruler
- Pencil and Rubber
- Scientific calculator, which you are expected to use when appropriate

Instructions

- Answer all questions
- Answer questions in the space provided
- All working must be shown

Information

- The marks for the questions are shown in brackets

1.

Neutralisation reactions can be used to make salts.

(a) Write an ionic equation for a neutralisation reaction, including state symbols.

(2)

(b) Ammonium nitrate is a salt used as a fertiliser.



(i) Ammonium nitrate is made by mixing two solutions. Name these solutions.

_____ and _____

(1)

(ii) Hazard information about ammonium nitrate states:

- it is not itself a fire hazard (does not burn);
- it must not be allowed to come into contact with combustible materials such as fuels because it can cause these to catch fire.

Suggest why ammonium nitrate helps other substances to burn.

(1)

(Total 4 marks)

2.

Poly(ethene) is a polymer with many uses.

(a) Poly(ethene) is not biodegradable.

Give **one** problem caused by waste poly(ethene).

(1)

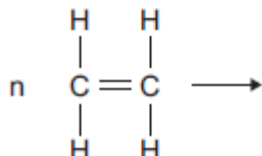
(b) Many molecules of ethene are combined to make poly(ethene). Ethene is an alkene.

(i) Complete the sentence about the colour change in the test for alkenes.

Alkenes turn bromine water from _____ to _____ .

(2)

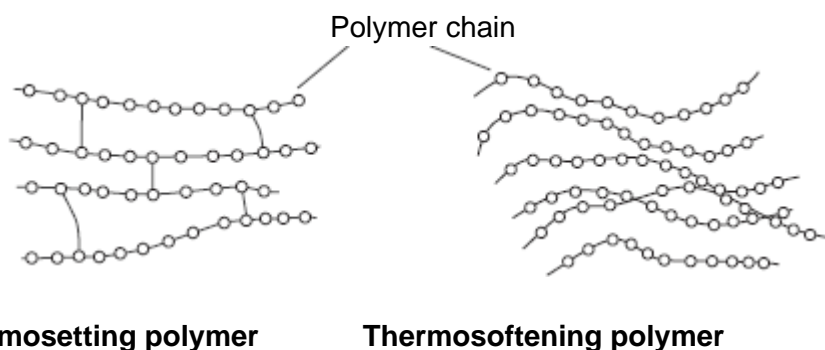
(ii) Complete the equation below to show the formation of poly(ethene).



(3)

(c) Poly(ethene) is a thermosoftening polymer that melts when heated.

The diagrams show a thermosetting polymer and a thermosoftening polymer.



The thermosetting polymer does **not** melt when heated.

Use the diagrams and your knowledge of structure and bonding to explain why.

(3)

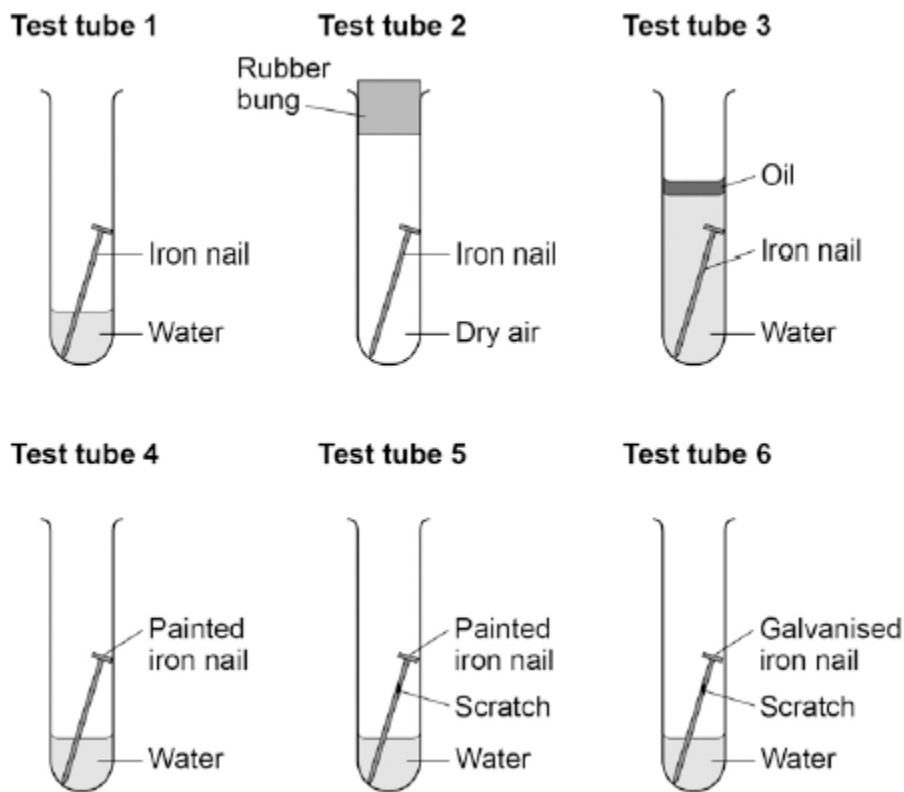
(Total 9 marks)

3.

The figure below shows six test tubes a student set up to investigate the rusting of iron.

This is the method used for each test tube.

1. Measure the mass of the nail using a balance.
2. Leave the nail in the test tube for 6 days.
3. Measure the mass of the nail after 6 days.



The table below shows the student's measurements.

Test tube	Mass of nail in g	Mass of nail after 6 days in g
1	8.45	8.91
2	8.46	8.46
3	8.51	8.51
4	9.65	9.65
5	9.37	9.45
6	9.79	9.79

(a) What is the resolution of the balance the student used?

Tick **one** box.

$1 \times 10^{-3} \text{ g}$

$1 \times 10^{-2} \text{ g}$

$1 \times 10^{-1} \text{ g}$

$1 \times 10^2 \text{ g}$

(1)

- (b) Calculate the difference in percentage increase in mass after 6 days of the nail in test tube **1** and the nail in test tube **5**.

Give your answer to **three** significant figures.

Difference in percentage increase in mass = _____ %

(4)

- (c) Use the results of the student's investigations to draw conclusions about the factors affecting the rusting of iron. Include an evaluation of the effectiveness of different coatings at preventing the rusting of iron.

(6)

- (d) Rust is hydrated iron(III) oxide.

Complete the word equation for the reaction.

_____ + _____ + _____ → hydrated iron(III) oxide

(2)

(Total 13 marks)

4.

Water from a lake in the UK is used to produce drinking water.

- (a) What are the two main steps used to treat water from lakes?

Give a reason for each step.

Step 1 _____

Reason _____

Step 2 _____

Reason _____

(2)

(b) Explain why it is more difficult to produce drinking water from waste water than from water in lakes.

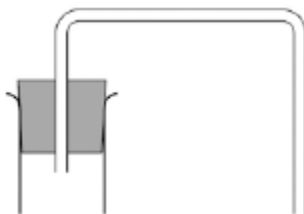
(3)

(c) Some countries make drinking water from sea water.

Complete the figure below to show how you can distil salt solution to produce and collect pure water.

Label the following:

- pure water
- salt solution



(3)

(d) How could the water be tested to show it is pure?

Give the expected result of the test for pure water.

(2)

(e) Why is producing drinking water from sea water expensive?

(1)

(Total 11 marks)

5.

Metals are extracted from ores in the Earth's crust.

Some ores contain metal carbonates and some ores contain metal oxides.

(a) (i) Name the type of reaction that happens when a metal carbonate is heated.

(1)

(ii) Which solid product is formed when copper carbonate is heated?

Tick (✓) **one** box.

copper

copper nitrate

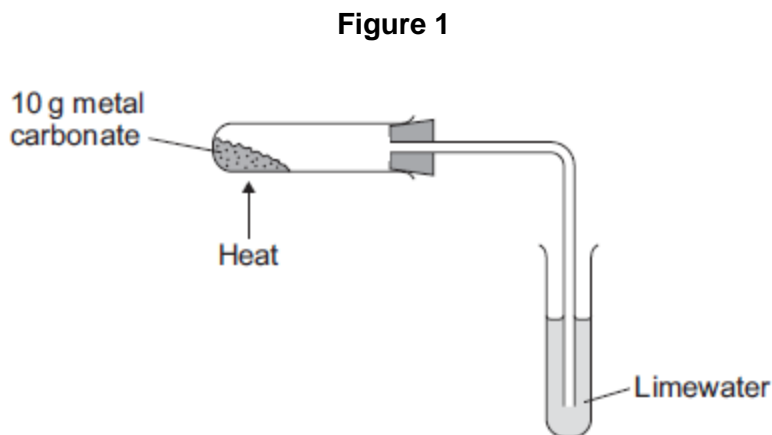
copper oxide

copper sulfide

(1)

(b) A student investigated heating four metal carbonates.

Figure 1 shows the apparatus used.



The student heated each metal carbonate for five minutes.

The table below shows the results.

Metal carbonate	Mass of metal carbonate at start in g	Mass of solid after heating for 5 minutes in g	Observations
Copper carbonate	10.0	6.9	Limewater turns cloudy
Magnesium carbonate	10.0	9.1	Limewater turns cloudy
Potassium carbonate	10.0	10.0	Limewater does not turn cloudy
Zinc carbonate	10.0	8.3	Limewater turns cloudy

(i) Explain the results for potassium carbonate.

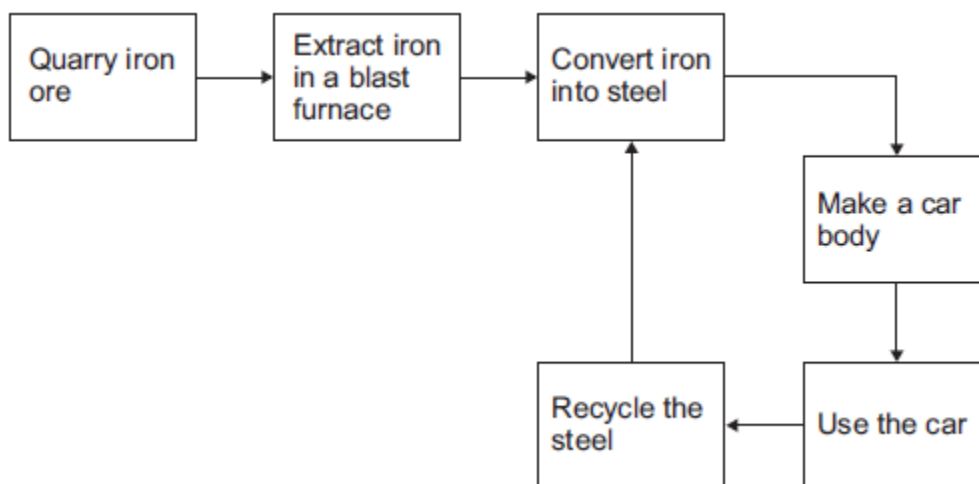
(3)

- (ii) Suggest how the reactivity series can be used to predict which metal carbonate reacts most easily when heated.

(2)

- (c) **Figure 2** shows a simple life cycle of a car body.

Figure 2



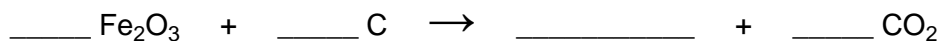
- (i) Complete the sentence.

Iron ores must contain enough iron to _____

(1)

- (ii) Some iron ores contain iron oxide (Fe_2O_3).

Complete and balance the equation for a reaction to produce iron from iron oxide.



(2)

(iii) Give **two** reasons why iron produced in a blast furnace is converted into steel.

(2)

(iv) When a car reaches the end of its useful life, the car body can be:

- recycled
- reused
- sent to landfill.

Give **three** reasons why a steel car body should be recycled and **not** reused or sent to landfill.

(3)

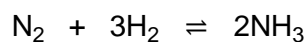
(Total 15 marks)

6.

This question is about ammonia and fertilisers.

(a) Ammonia is produced by a reversible reaction.

The equation for the reaction is:



Complete the sentence.

The forward reaction is exothermic, so the reverse reaction

is _____

(1)

(b) Calculate the percentage by mass of nitrogen in ammonia (NH₃).

Relative atomic masses (A_r): H = 1; N = 14

You **must** show how you work out your answer.

Percentage by mass of nitrogen = _____ %

(3)

(c) A neutral solution can be produced when ammonia reacts with an acid.

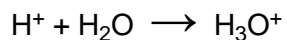
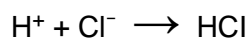
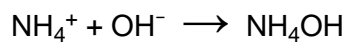
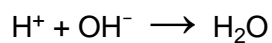
(i) Give the pH of a neutral solution.

pH _____

(1)

(ii) Which of these ionic equations shows a neutralisation reaction?

Tick (✓) **one** box.



(1)

(iii) Name the salt produced when ammonia reacts with hydrochloric acid.

(1)

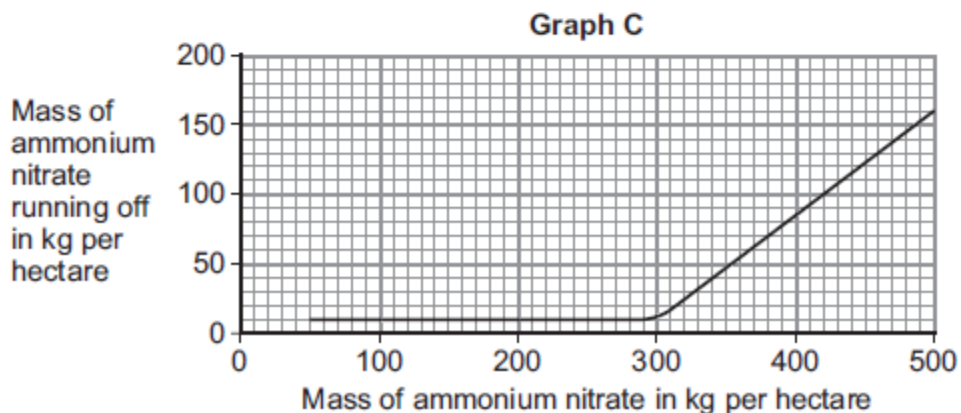
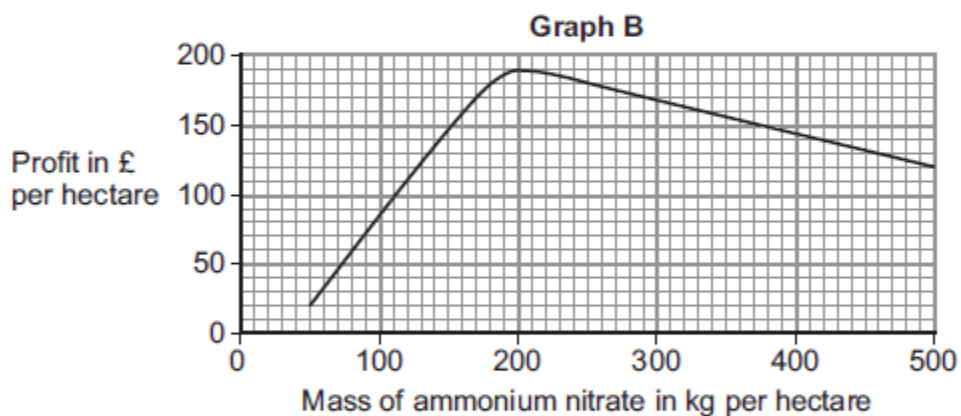
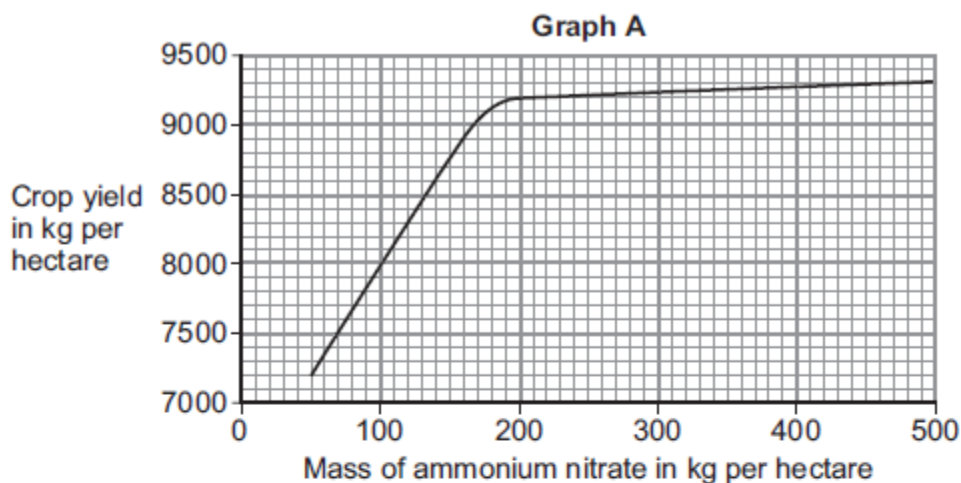
- (d) In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.

Farmers use ammonium nitrate as a fertiliser for crops.

Rainwater dissolves ammonium nitrate in the soil.

Some of the dissolved ammonium nitrate runs off into rivers and lakes.

The graphs **A**, **B** and **C** below show information about the use of ammonium nitrate as a fertiliser. A hectare is a measurement of an area of land.



Suggest how much ammonium nitrate farmers should use per hectare.

7.

This question is about metals and alloys.

(a) Explain how electricity is conducted in a metal.

To gain full marks you must include a description of the structure and bonding of a metal.

(4)

(b) Describe how the structure of an alloy is different from the structure of a pure metal.

(2)

(c) Alloys are used to make dental braces and coins.

(i) Nitinol is an alloy used in dental braces.

Why is Nitinol used in dental braces?

(1)

(ii) Suggest **one** reason why coins are not made of pure copper.

Do **not** give cost as a reason.

(1)

(iii) Some coins are made from an alloy of aluminium.

Complete the sentence.

Aluminium is manufactured by the electrolysis of a molten mixture of cryolite and _____ .

(1)

(iv) Banks keep coins in poly(ethene) bags. These bags are made from low density poly(ethene).

High density poly(ethene) can also be made from the same monomer.

How can the same reaction produce two different products?

(1)

(d) Give **two** reasons why instrumental methods of analysis are used to detect impurities in metals.

(1)

(Total 11 marks)

8.

Many everyday items are made from iron.

(a) Haematite is an *ore* of iron. Haematite contains iron oxide, Fe_2O_3 .

(i) What is the meaning of the term *ore*?

(1)

(ii) Iron can be produced by reacting iron oxide with carbon in a blast furnace.

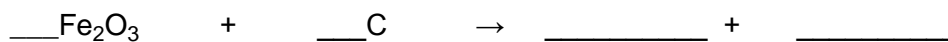
What type of reaction produces the iron?

(1)

(iii) The word equation for this reaction is:

iron oxide + carbon → iron + carbon dioxide

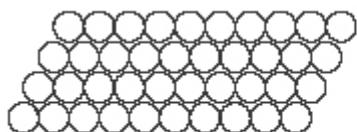
Complete and balance the symbol equation for this reaction.



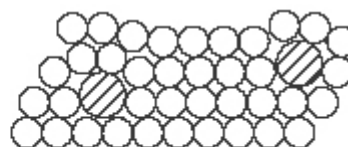
(2)

(b) Pure iron is relatively soft and not very strong.

The iron from the blast furnace is very hard and brittle. It contains about 4% carbon and is used as cast iron.



Pure iron

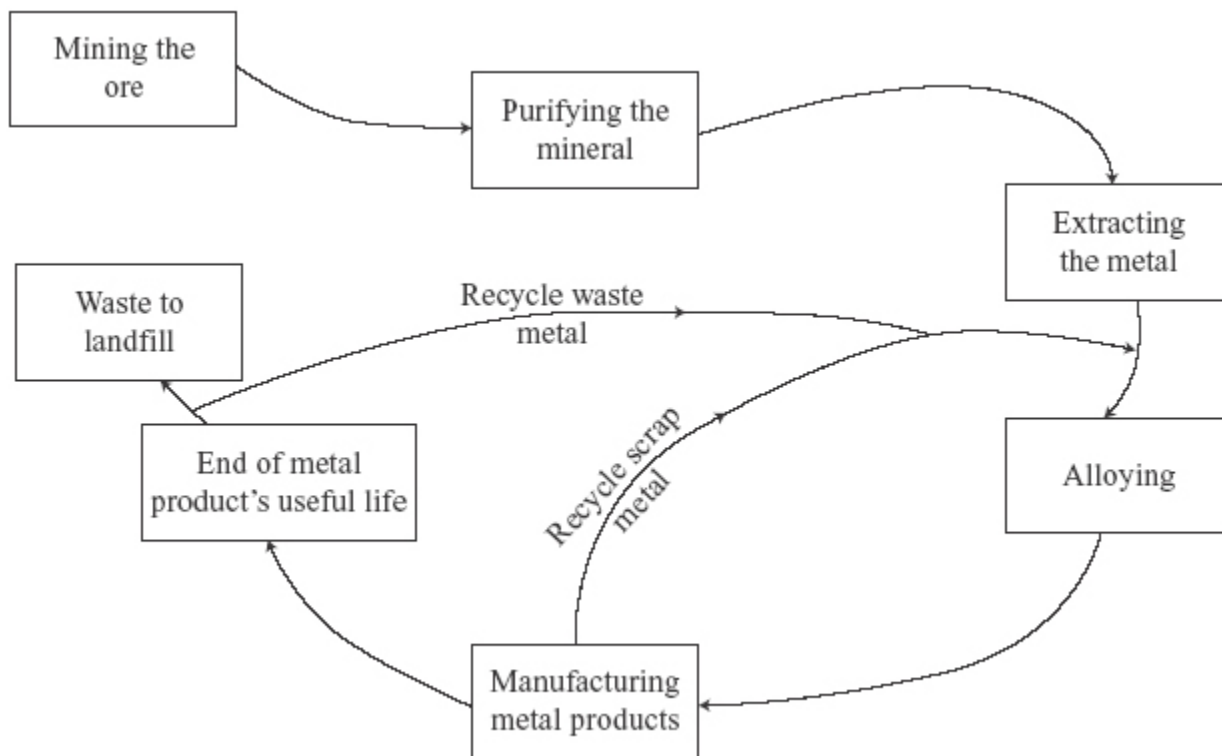


Cast iron

Explain the differences in the properties of pure iron and cast iron by referring to the diagrams.

(3)

(c) The diagram shows the way in which iron is extracted, used and recycled.



Explain why the recycling of iron is necessary for sustainable development.

(3)
(Total 10 marks)