

Name:

Date:

C10 - Test 1
USING RESOURCES
Beginner

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

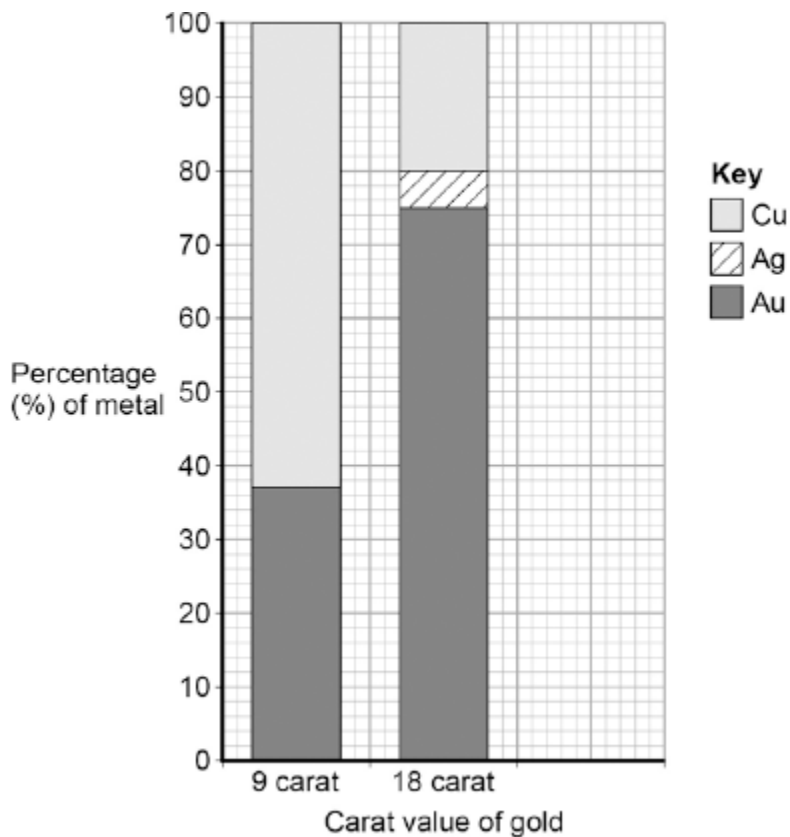
- Answer all questions
- Answer questions in the space provided
- All working must be shown

Information

- The marks for the questions are shown in brackets

1. Gold is mixed with other metals to make jewellery.

The figure below shows the composition of different carat values of gold.



(a) What is the percentage of gold in 12 carat gold?

Tick **one** box.

12 % 30 % 50 % 80 %

(1)

(b) Give the percentage of silver in 18 carat gold.

Use the figure above to answer this question.

Percentage = _____ %

(1)

(c) Suggest **two** reasons why 9 carat gold is often used instead of pure gold to make jewellery.

- 1. _____

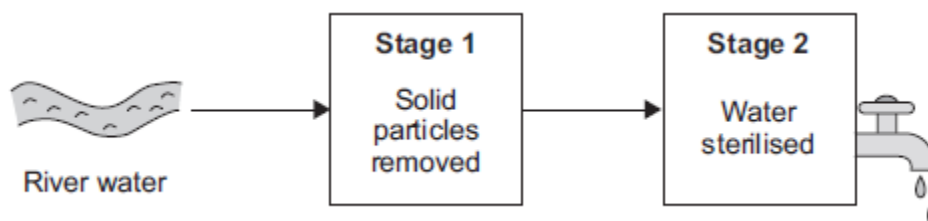
- 2. _____

(2)
(Total 4 marks)

2. This question is about water.

River water needs to be treated before it is safe to drink.

(a) The diagram shows two stages of the treatment of river water.



(i) What is the name of the process used to remove solid particles in **Stage 1**?

Tick (✓) **one** box.

Crystallisation

Fermentation

Filtration

(1)

(ii) What is added in **Stage 2** to sterilise the water?

Tick (✓) **one** box.

Chlorine

Fluoride

Potassium

(1)

(b) Toxic substances in river water are removed by adding very small amounts of iron oxide nanoparticles.

(i) How is the size of nanoparticles different from normal-sized particles?

(1)

(ii) Nanoparticles are needed in only very small amounts.

Suggest why.

(1)

(c) In certain areas of the UK, tap water contains aluminium ions.

What would you **see** when sodium hydroxide solution is added drop by drop to tap water containing aluminium ions?

(2)

(Total 6 marks)

3.

Polymers are used to make fabrics.

Table 1 shows some properties of two polymers.

Table 1

Property	Polymer J	Polymer K
Density in g/cm ³	0.9	1.4
Melting point in °C	165	260
Flame resistance	Poor	Good
Water absorption	Low	High

(a) Polymer fabrics are used to make firefighter uniforms.

Complete **Table 2** by deciding for each property whether polymer J or polymer K is best for firefighter uniforms.

Use **Table 1**.

Density has been completed for you.

Tick **three** boxes.

Table 2

Property	Polymer J	Polymer K
Density in g/cm ³	✓	
Melting point in °C		
Flame resistance		
Water absorption		

(2)

(b) A firefighter uniform made from polymer **J** has a mass of 6.0 kg

Calculate the mass of a uniform of the same size made from polymer **K**.

Use **Table 1** and the equation:

$$\text{mass of uniform made from polymer K} = \frac{\text{density of polymer K}}{\text{density of polymer J}} \times 6.0$$

Mass of uniform made from polymer **K** = _____ kg

(2)

(c) Polymers **J** and **K** are both thermosoftening polymers.

Polymer **L** is a thermosetting polymer.

Why would polymer **L** be better than polymers **J** and **K** for firefighter uniforms?

Tick **one** box.

Polymer **L** burns easily

Polymer **L** does not biodegrade

Polymer **L** will not melt

(1)

Polymers **J** and **K** are made from crude oil.

In the past, firefighter uniforms were made from wool.

Wool is obtained from sheep.

(d) Why are many fabrics made from polymers instead of wool?

Tick **one** box.

Polymers are man-made

Polymers are more hard-wearing

Wool is more easily available

Wool is more flame resistant

(1)

(e) Why is wool more sustainable than polymers **J** and **K** for making firefighter uniforms?

(2)

(Total 8 marks)

4.

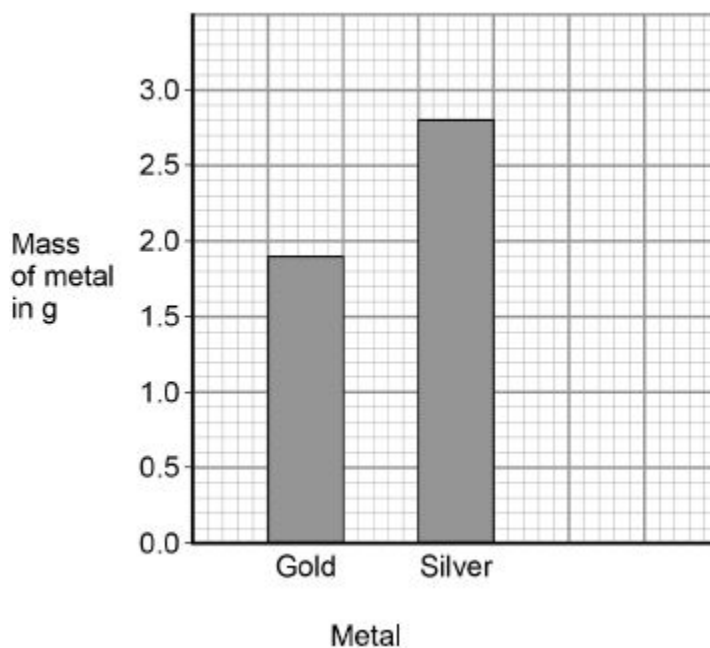
A 9 carat gold ring is made from a mixture of metals.

The table below shows the mass of different metals in the ring.

The mass of the ring is 5.0 g

Metal	Mass of metal in g
Gold	1.9
Silver	2.8
Copper	0.3

(a) Plot the data for copper from the table above on the graph below.



(2)

(b) The cost of gold is £30 per gram.

Calculate the cost of the gold used in the 9 carat gold ring.

Use the table above.

Cost of gold = £ _____

(1)

(c) Rings can be made from 22 carat gold.

The ratio of the mass of gold in 22 carat gold compared to 9 carat gold is 22 :9

Calculate the mass of gold in a 22 carat gold ring of mass 5.0 g

Use the table above.

Mass of gold = _____ g

(2)

(d) Pure gold is 24 carats.

Suggest **two** reasons why silver and copper are mixed with gold to make 9 carat gold rings.

1. _____

2. _____

(2)

(e) Copper is obtained from copper ores or by recycling copper.

- Copper ores are non-renewable.
- Copper ores can be obtained by mining.
- Some scrap copper goes to landfill sites.

Give **three** reasons why we should use recycled copper instead of copper from copper ores.

1. _____

2. _____

3. _____

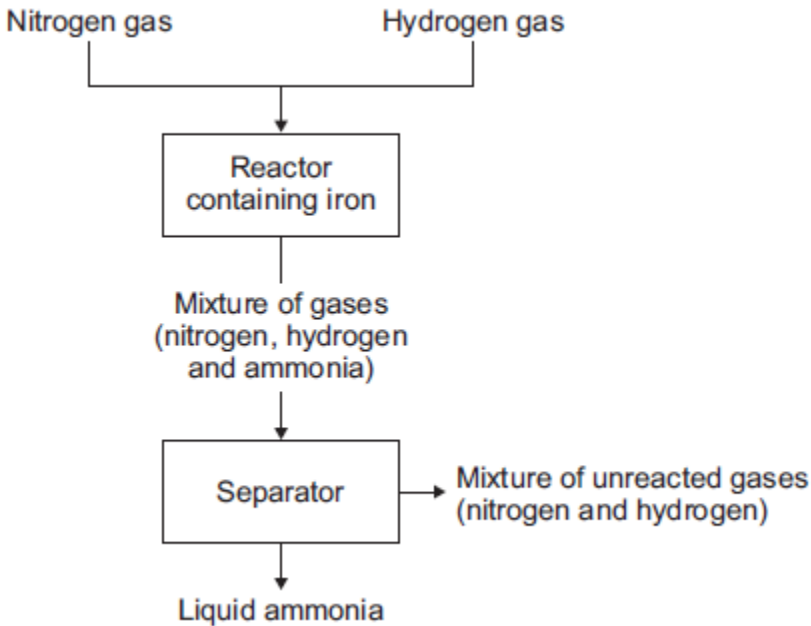
(3)

(Total 10 marks)

5.

This question is about the Haber process.

The diagram below shows a flow diagram for the Haber process.



- (a) (i) Nitrogen gas and hydrogen gas are obtained from different sources. Draw **one** line from each gas to its source.

Gas	Source
	Air
Nitrogen	Iron ore
Hydrogen	Limestone
	Natural gas

(2)

- (ii) Explain why iron is used in the reactor for the Haber process.

(2)

(iii) Describe how the ammonia is separated from the other gases.

(2)

(iv) What happens to the mixture of unreacted gases (nitrogen and hydrogen)?

(1)

(b) The reaction to produce ammonia is reversible.

Complete the word equation for this reaction.

nitrogen + _____

(2)

(Total 9 marks)

6.

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

(a) Why is copper used in the manufacture of computers?

Tick (✓) **one** box.

Because it has a high density.

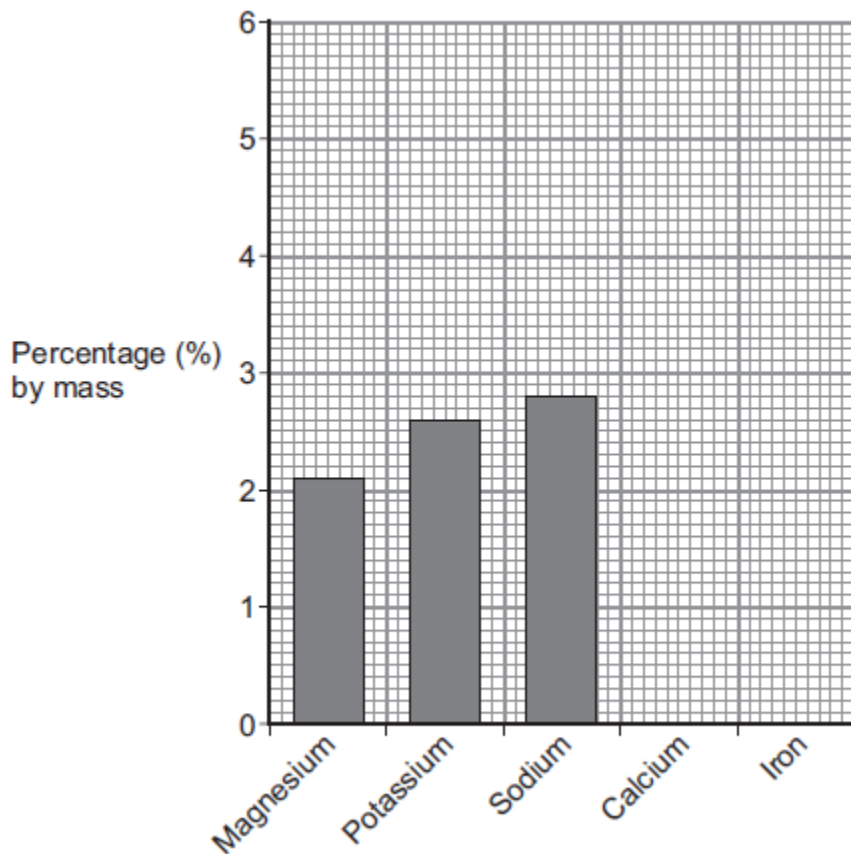
Because it does not react with water.

Because it is a good conductor of electricity.

(1)

(b) **Figure 1** shows the percentage (%) by mass of some metals in the Earth's crust.

Figure 1



(i) What is the percentage by mass of magnesium in the Earth's crust?

_____ %

(1)

(ii) On **Figure 1** draw the bars for:

- calcium at 3.6% by mass
- iron at 5.0% by mass.

(2)

(c) An ore of zinc contains zinc carbonate.

The equation for the reaction when zinc carbonate is heated is:



(i) What is the name of this type of reaction?

Tick (✓) **one** box.

corrosion

decomposition

electrolysis

(1)

(ii) Which substance in the equation is a gas at room temperature (20 °C)?

Tick (✓) **one** box.

zinc carbonate

zinc oxide

carbon dioxide

(1)

(iii) Complete the table below to show the number of atoms of carbon and oxygen in the formula of zinc carbonate.

Element	Number of atoms in the formula ZnCO ₃
zinc, Zn	1
carbon, C	
oxygen, O	

(2)

(iv) When 125 g zinc carbonate is heated, 81 g zinc oxide is produced.

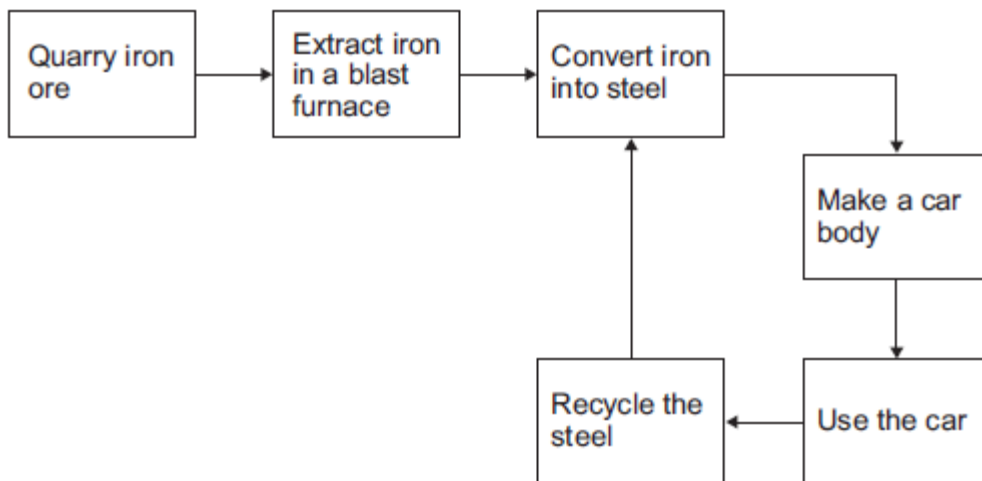
Calculate the mass of carbon dioxide produced.

Mass of carbon dioxide = _____ g

(1)

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

Figure 2



(i) What is **one** reason why iron from the blast furnace is converted into steel?

Tick (✓) **one** box.

To make the iron pure.

To make the iron more brittle.

To make alloys for specific uses.

(1)

(ii) Apart from cost, give **three different** reasons why steel should be recycled.

1. _____

2. _____

3. _____

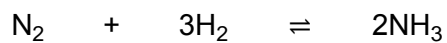
(3)

(Total 13 marks)

7.

The Haber Process is used to produce ammonia from nitrogen and hydrogen.

The equation for the reaction is:



(a) An ammonia molecule has the formula NH_3

How many atoms are there in one molecule of ammonia?

Tick (✓) **one** box.

2 3 4 6

(1)

(b) What does the symbol \rightleftharpoons mean?

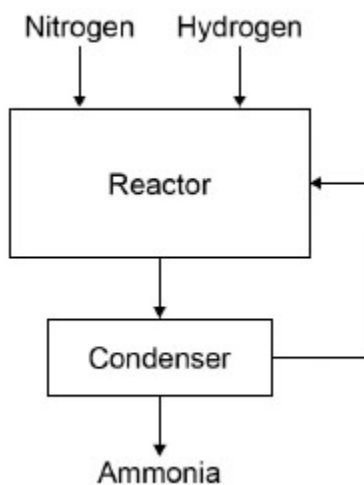
(1)

(c) Draw **one** line from each gas to the source of that gas.

Gas	Source
Hydrogen	Air
Nitrogen	Alcohol
	Ammonia
	Iron
	Natural gas

(2)

The diagram shows the Haber process.



A mixture of ammonia, hydrogen and nitrogen gases leave the reactor.

Table 1 shows the boiling points of the gases.

Table 1

Gas	Boiling point in °C
Ammonia	- 33
Nitrogen	- 196
Hydrogen	- 253

(d) The mixture is cooled to a temperature at which **only** the ammonia condenses to a liquid.

Which temperature could be used?

Tick (✓) **one** box.

- 20 °C

- 40 °C

- 200 °C

- 260 °C

(1)

(e) What happens to the unreacted nitrogen?

Tick (✓) **one** box.

Collected and sold

Recycled to the reactor

Released into the air

Used as a catalyst

(1)

Ammonia from the Haber process can be used to produce fertilisers.

Table 2 gives information about two compounds used in fertilisers.

Table 2

Fertiliser	Compound	Cost in £ / kg
A	Potassium chloride	0.24
B	Diammonium phosphate	0.35

(f) What type of bonding is present in potassium chloride?

Tick (✓) **one** box.

Covalent

Ionic

Metallic

(1)

(g) Diammonium phosphate has the chemical formula $(\text{NH}_4)_2\text{HPO}_4$

Which **two** elements in $(\text{NH}_4)_2\text{HPO}_4$ improve agricultural productivity?

Tick (✓) **two** boxes.

- | | |
|------------|--------------------------|
| Chlorine | <input type="checkbox"/> |
| Hydrogen | <input type="checkbox"/> |
| Nitrogen | <input type="checkbox"/> |
| Oxygen | <input type="checkbox"/> |
| Phosphorus | <input type="checkbox"/> |

A farmer uses fertilisers **A** and **B** on a field with an area of 0.05 km^2

(2)

(h) 50 kg of fertiliser A will cover an area of 0.01 km^2

Calculate the cost of fertilising a field with an area of 0.05 km^2 with fertiliser **A**.

Use **Table 2**.

Cost = £ _____

(2)

(i) Fertiliser **B** is more expensive than fertiliser **A**.

Suggest why the farmer uses **both** fertilisers.

(1)

(Total 12 marks)

8.

Potable water is water that is safe to drink.

Seawater can be changed into potable water by desalination.

- (a) Name the substance removed from seawater by desalination.

(1)

- (b) Desalination requires large amounts of energy.

Desalination is only used when there is no other source of potable water.

Give **one** reason why.

(1)

Water from lakes and rivers can be treated to make it potable.

- (c) The first stage is to filter the water from lakes and rivers.

Why is the water filtered?

(1)

- (d) Chlorine gas is then added to the filtered water.

Why is chlorine gas used to treat water?

(1)

- (e) Describe a test for chlorine gas.

Give the result of the test if chlorine is present.

Test _____

Result _____

(2)

Some students investigated different water samples.

The table shows some of their results.

Water	pH	Mass of dissolved solid in g / dm ³
Tap water	6.5	0.5
Seawater	8.1	35.0
Pure water		

(f) Complete the table above to show the expected results for pure water.

(2)

(g) What mass of dissolved solid is present in 100 cm³ of the sample of tap water?

Tick (✓) **one** box.

0.05 g

0.5 g

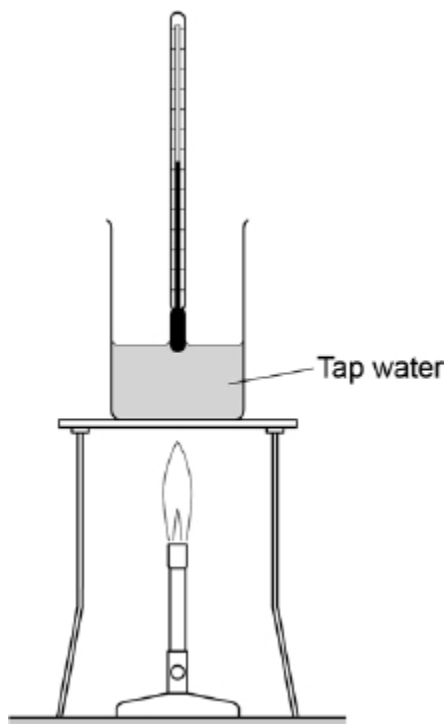
5 g

50 g

(1)

(h) Boiling points can be used to show whether substances are pure.

The diagram shows the apparatus the students used to find the boiling point of tap water.



The students made a mistake setting up the apparatus.

What mistake did the students make?

(1)
(Total 10 marks)