Using Earth's res, Potable Water

Question Paper

Level	GCSE (9-1)
Subject	Combined Science: Trilogy - Chemistry
Exam Board	AQA
Topic	5.10 Using Resources
Sub-Topic	Using Earth's res, Potable Water
Difficulty Level	Bronze Level
Booklet	Question Paper

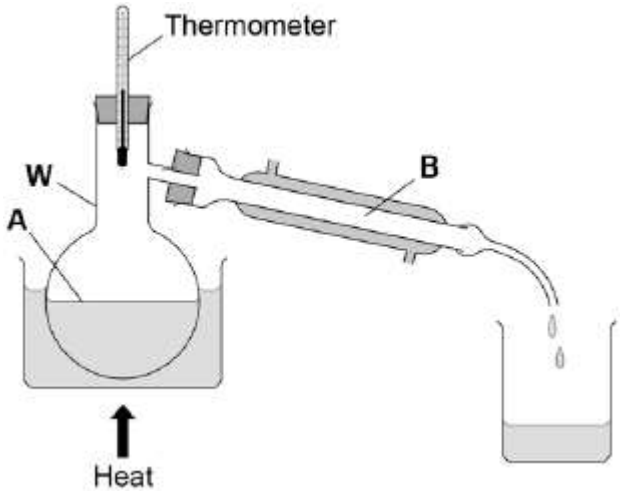
Time Allowed: **46 minutes**

Score: **/44**

Percentage: **/100**

Grade Boundaries:

Q1. The apparatus in the figure below is used to separate a mixture of liquids in a fuel.



(a) What is apparatus **W** on above the figure above?

Tick **one** box.

- Beaker ☐
- Boiling Tube ☐
- Flask ☐
- Jug ☐

(1)

(b) What is the name of this method of separation?

Tick **one** box.

- Crystallisation ☐
- Electrolysis ☐
- Filtration ☐

Distillation ☐

(1)

(c) Name the changes of state taking place at **A** and **B** in the figure above.

Use words from the box.

boiling	**condensing**	**freezing**	**melting**

Change of state at **A**: .....

Change of state at **B**: .....

(2)

(d) **Table 1** shows the boiling points of the hydrocarbons in the fuel.

Table 1

Hydrocarbon	Boiling point in °C
Pentane	36
Hexane	69
Heptane	98
Octane	125

Which hydrocarbon will be the last to collect in the beaker?

Tick **one** box.

Pentane ☐

Hexane ☐

Heptane ☐

Octane ☐

(1)

(e) The fuel is a mixture of liquids that has been designed as a useful product.

What name is given to this type of mixture?

Tick **one** box.

Catalyst ☐

Formulation ☐

Polymer ☐

Solvent ☐

(1)

(f) Describe how this fuel is different from crude oil.

.....

.....

.....

.....

(2)

(g) A student measured the melting point of a solid hydrocarbon four times.

The student's results are in **Table 2**.

Table 2

	Trial 1	**Trial 2**	**Trial 3**	**Trial 4**
Melting	35	48	37	37

point in °C				

Calculate the mean melting point of the hydrocarbon, leaving out any anomalous result.

Give your answer to two significant figures.

.....

.....

Mean melting point = ... °C

(2)

(Total 10 marks)

Q2. This question is about drinking water.

(a) Name **two** methods of treating water from rivers, lakes or the sea to produce drinking water.

Tick **two** boxes.

Anaerobic digestion ☐

Cracking ☐

Desalination ☐

Electrolysis ☐

Sterilising ☐

(2)

(b) The table below shows the amounts of dissolved ions in a sample of drinking water.

Dissolved ion	**Mass in mg per dm^3**
Cl^-	250

Na^+	200
NO_3^+	40

What is the name of the ion with the symbol Cl^-?

Tick **one** box.

Calcium ion ☐

Carbonate ion ☐

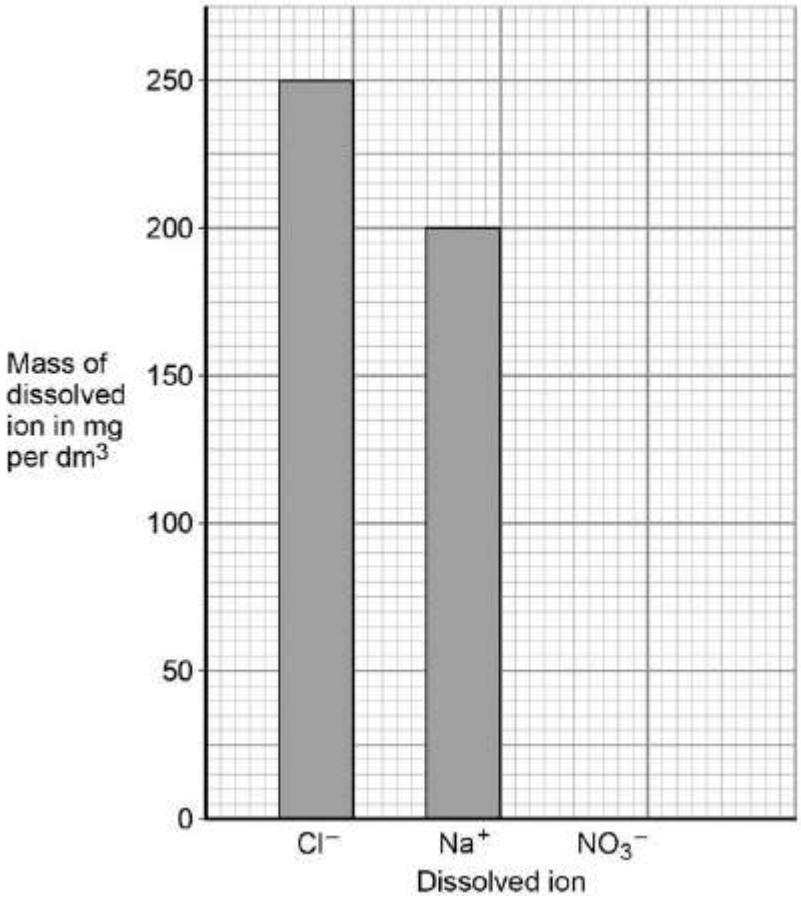
Chloride ion ☐

Chlorine ion ☐

(1)

(c) Use the information in the table above to complete the bar chart in **Figure 1**.

Figure 1



(1)

(d) Look at the questions labelled **A, B, C, D**.

A How many substances are there in drinking water?

B How much fluoride is in drinking water?

C Is fluoride soluble in drinking water?

D Should fluoride be added to drinking water?

Which **one** of the questions cannot be answered by science alone?

Tick **one** box.

A		**B**		**C**		**D**	

(1)

(e) Give **two** reasons why the answer you have chosen cannot be answered by science alone.

1 .....

.....

2 .....

.....

(2)

(f) A sample of drinking water contains 1.5 mg of fluoride per dm^3 of water.
A person drinks 1 dm^3 of this water.

The recommended daily amount of fluoride is 4.0 mg.

Which calculation gives the percentage of the recommended daily amount of fluoride in 1 dm^3 of this water?

Tick **one** box.

$\frac{1.5}{4.0} \times 100$ ☐

$\frac{1.5}{100} \times 4.0$ ☐

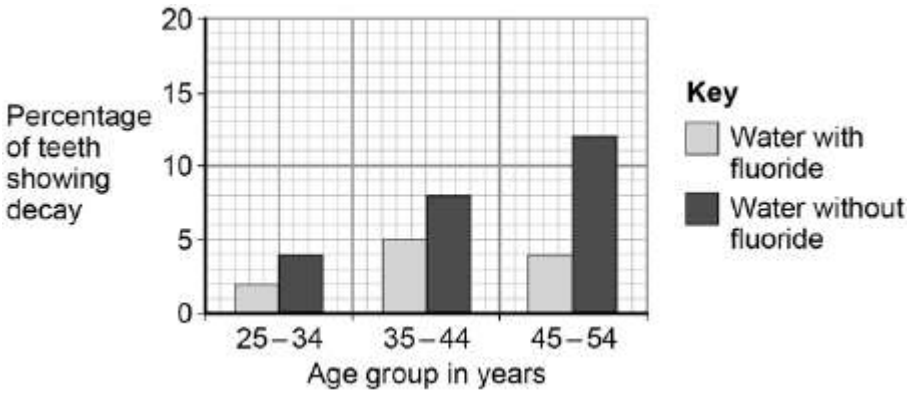
$\frac{4.0}{1.5} \times 100$ ☐

$\frac{100}{1.5} \times 4.0$ ☐

(1)

(g) **Figure 2** shows the effect of fluoride in drinking water on tooth decay in different age groups.

Figure 2



Describe the pattern of tooth decay in **Figure 2** for water without fluoride.

Use data to justify your answer.

.....

.....

.....

.....

(2)

(h) Describe the effect of adding fluoride to drinking water for the age groups in **Figure 2**.

.....

.....

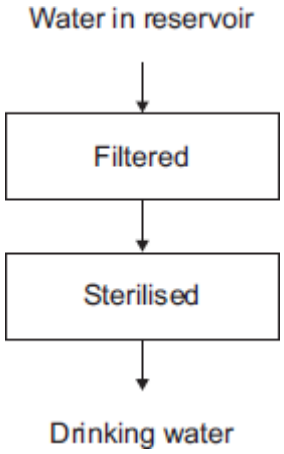
.....

.....

(2)
(Total 12 marks)

Q3. This question is about drinking water.

(a) The flow diagram below shows how water is made suitable for drinking.



(i) What is removed when the water is filtered?

Tick (✓) **one** box.

Gases ☐

Liquids ☐

Solids ☐

(1)

(ii) What is used to sterilise the water?

Tick (✓) **one** box.

Carbon ☐

Chlorine ☐

Sodium chloride ☐

(1)

(iii) Why is the water sterilised?

.....

.....

(1)

(b) Water can be purified by distillation.

Drinking water is **not** usually purified by distillation because distillation is expensive.

Complete the sentence.

Distillation is expensive because it requires a lot of

.....

(1)

(c) Why do some water companies add fluoride to drinking water?

.....

.....

(1)
(Total 5 marks)

Q4. Where copper ore has been mined there are areas of land that contain very low percentages of copper compounds.

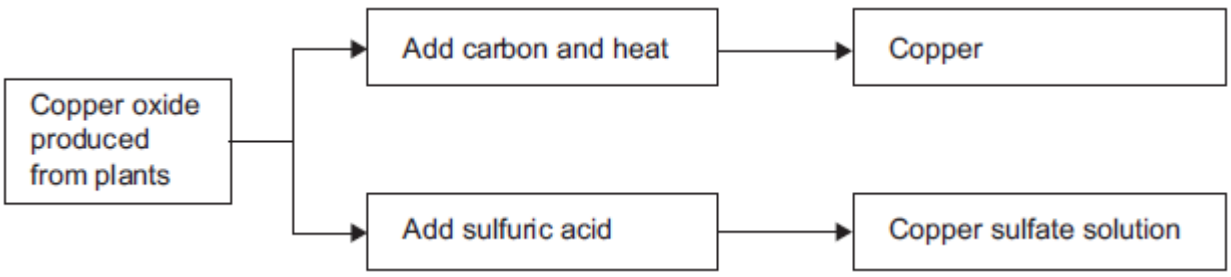
One way to extract the copper is to grow plants on the land.

The plants absorb copper compounds through their roots.

The plants are burned to produce copper oxide.

The copper oxide produced from plants can be reacted to produce copper or copper sulfate solution, as shown in **Figure 1**.

Figure 1



(a) Draw a ring around the correct answer to complete each sentence.

(i) Copper ores contain enough copper to make extraction of the metal

carbon neutral.
economical.
reversible.

(1)

(ii) Using plants to extract metals is called

photosynthesis.
phytomining.
polymerisation.

(1)

(iii) Copper oxide reacts with carbon to produce copper and

carbon dioxide.
oxygen.
sulfur dioxide.

(1)

(b) Copper is produced from copper sulfate solution by displacement using iron or by electrolysis.

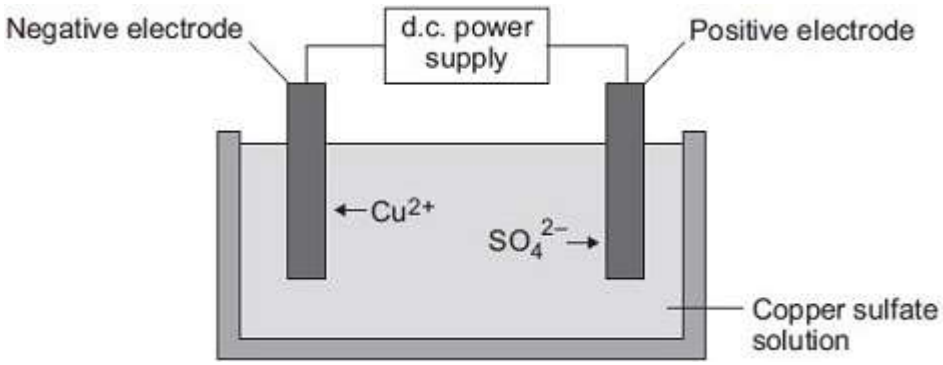
(i) Complete the word equation.

copper sulfate + iron ⟶ ..... + ...

(2)

(ii) **Figure 2** shows the electrolysis of copper sulfate solution.

Figure 2



Why do copper ions go to the negative electrode?

.....

.....

(1)

(c) Suggest **two** reasons why copper should **not** be disposed of in landfill sites.

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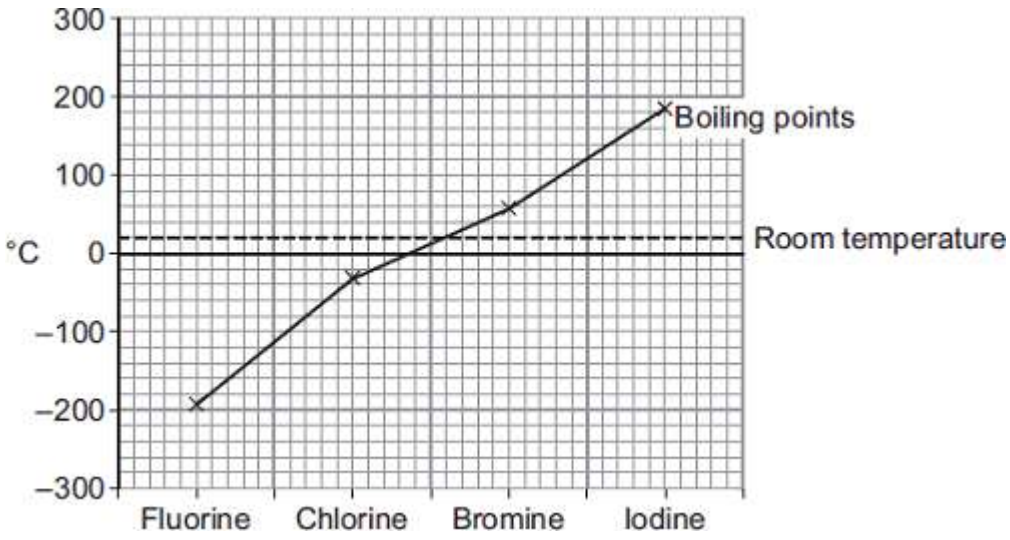
(2)
(Total 8 marks)

Q5. The graph shows the boiling points of the halogens.



(a) Use the graph to help you answer these questions.

(i) Use the correct answer from the box to complete the sentence.

gas	liquid	solid

At room temperature chlorine is a ..... .

(1)

(ii) Describe the trend in boiling point from fluorine to iodine.

.....

.....

(1)

(b) Chlorine reacts with metals to produce metal chlorides.

(i) When a chlorine atom forms a chloride ion it gains one electron.

What is the charge on a chloride ion?

.....

(1)

(ii) Write a word equation for the reaction between sodium and chlorine.

.....

(1)

(c) In the UK water companies add chlorine to tap water.

Why is chlorine added to tap water?

.....

(1)

(d) Water companies add fluoride to tap water in some parts of the UK.

Fluoride is added to improve dental health.

Suggest **one** reason why some people are against adding fluoride to tap water.

.....

.....

.....

(1)
(Total 6 marks)

Q6. Good quality water is needed for a healthy life.

In the United Kingdom, obtaining safe water for drinking is as simple as turning on a tap. The water is made safe to drink by water companies.

However, in many parts of Africa and Asia, water used for drinking is contaminated and untreated. It is estimated that 2.2 million people die each year as a result of drinking contaminated water.

DADA DANESHANANDA, Man with filtered water from the Mafi-Zongo water project. www.amurt.net/africa/ghana/2005

(a) Sea water is **not** used as drinking water.

Suggest why.

.....

.....

(1)

(b) Explain why water for drinking is filtered and then treated with chlorine.

.....

.....

.....

.....

(2)

(Total 3 marks)