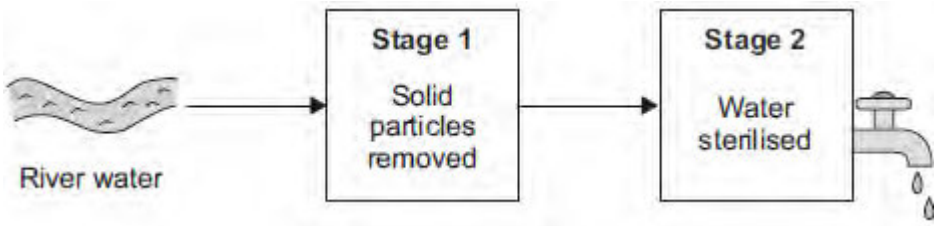
Q1. This question is about water.

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?

.....

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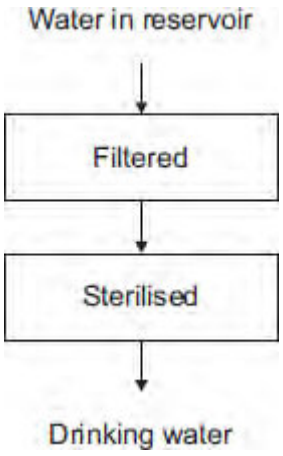
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(2)
(Total 6 marks)

Q2. 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?

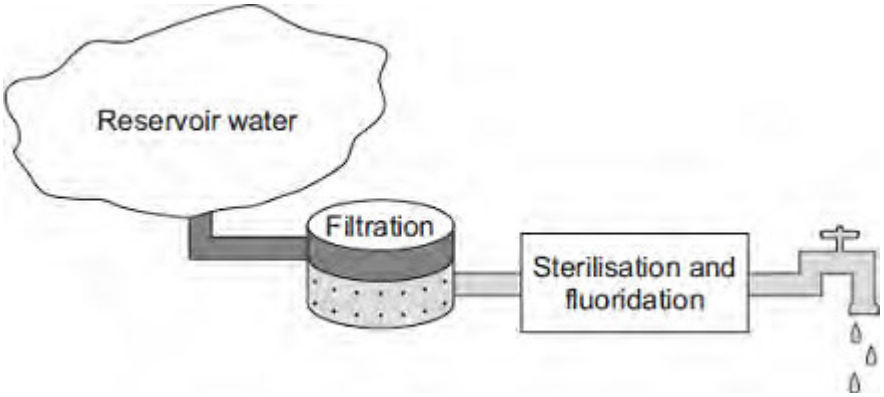
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(1)

(Total 5 marks)

Q3. The diagram shows three stages in the treatment of reservoir water.



(a) (i) What is separated from the reservoir water during filtration?

Tick (✔) **one** box.

Bacteria ☐

Dissolved nitrates ☐

Solids ☐

(1)

(ii) What is added to sterilise the water?

Tick (✔) **one** box.

Calcium ☐

Chlorine ☐

Magnesium ☐

(1)

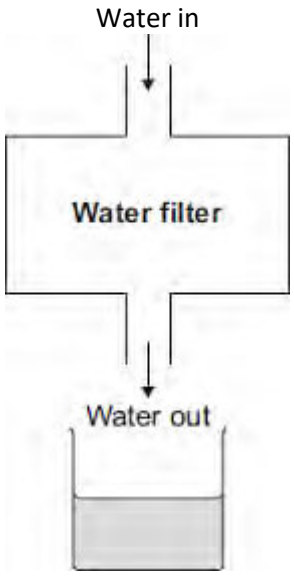
(iii) State **one** advantage of adding fluoride to drinking water.

.....

.....

(1)

(b) The diagram shows a water filter used in the home.



A student collected a sample of water from the filter.

The student could show that the filtered water contains dissolved salts without using a chemical test.

Describe how.

.....

.....

.....

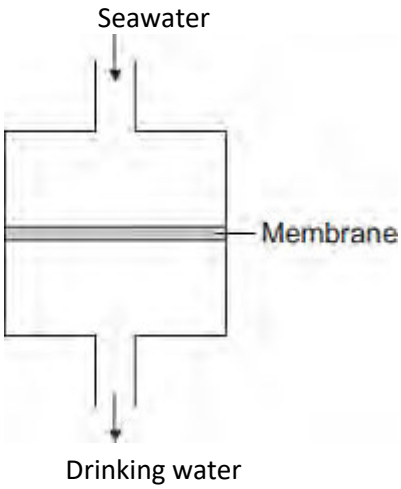
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(2)

(c) Seawater is forced through a membrane to make drinking water.



Suggest why water molecules can pass through the membrane, but sodium ions and chloride ions cannot.

.....

.....

(1)
(Total 6 marks)

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

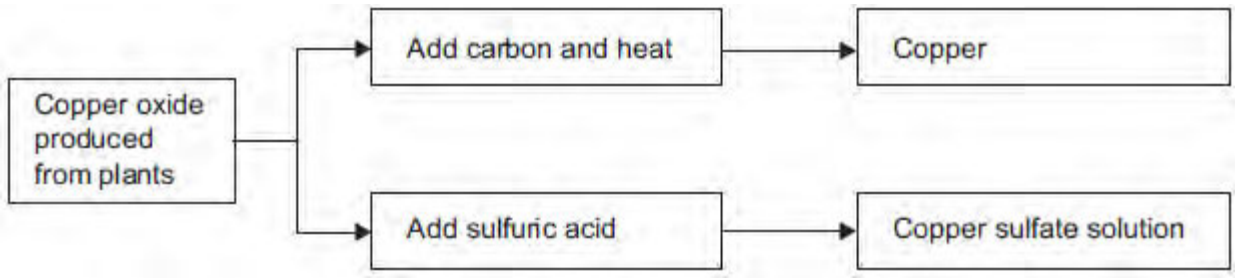
One way to extract the copper is to grow plants on the land.

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.

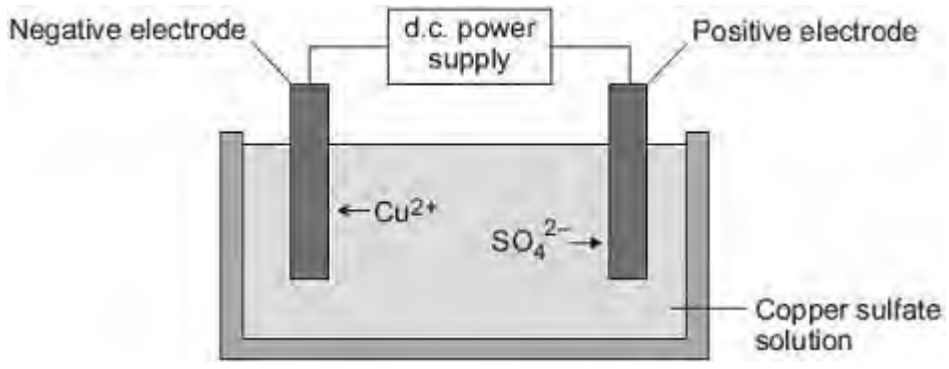
(i) Complete the word equation.

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.

.....

.....

.....

.....

(2)
(Total 8 marks)

Q5. 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)