AQA GCSE Chemistry | 8462

SPECIFICATION POINT 4.10.1.2

Potable water

Past-paper questions

Tier	**Foundation**
Question groups	**14**
Available paper years	**2008–2024**

Using this booklet

1. Answer the questions in order and show your working.
2. Original question numbers and marks are retained.
3. Print at actual size (100%) for measuring questions.
4. Use the companion answer booklet to check your work.

Name: _____ **Date:** _____

Whole questions are retained for context, so some parts assess other specification points. Current and legacy sources are labelled. Continue on extra paper if needed.

4.10.1.2 Potable water

Question 01

June 2008 | CHY3F | Original Q5 | Legacy

5 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.



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

Suggest why.

.....

.....

(1 mark)

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

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.....

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(2 marks)

3

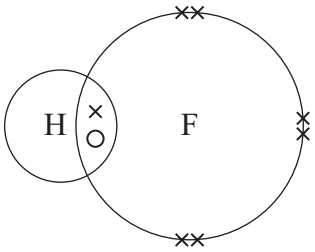
4.10.1.2 Potable water

Question 02

June 2009 | CHY2F | Original Q4 | Legacy

4 This question is about fluorine and some of its compounds.

4 (a) The diagram represents a molecule of hydrogen fluoride.



Draw a ring around the type of bonding that holds the hydrogen and fluorine atoms together in this molecule.

covalent **ionic** **metallic**

(1 mark)

4 (b) Fluorine is made in industry by the electrolysis of a mixture of potassium fluoride and hydrogen fluoride.

4 (b) (i) Use **one** word from the box to complete the sentence.

gas	**liquid**	**solid**

To allow electrolysis to take place the mixture of potassium fluoride and hydrogen fluoride must be ..... . *(1 mark)*

4.10.1.2 Potable water

Question 02 · continued

for mark

4 (b) (ii) The mixture of potassium fluoride and hydrogen fluoride contains fluoride ions (F^-), hydrogen ions (H^+) and potassium ions (K^+).

Use **one** word from the box to complete the sentence.

fluorine	**hydrogen**	**potassium**

During electrolysis the element formed at the **positive** electrode is

..... . *(1 mark)*

4 (c) Fluoride ions are sometimes added to drinking water. It is thought that these ions help to reduce tooth decay.

4 (c) (i) Tick (✓) **one** question that **cannot** be answered by scientific investigation alone.

Question	Tick (✓)
Do fluoride ions in drinking water reduce tooth decay?	
Are fluoride ions in drinking water harmful to health?	
Should fluoride ions be added to drinking water?	

(1 mark)

4 (c) (ii) Explain why you have chosen this question.

.....

.....

(1 mark)

5

4.10.1.2 Potable water

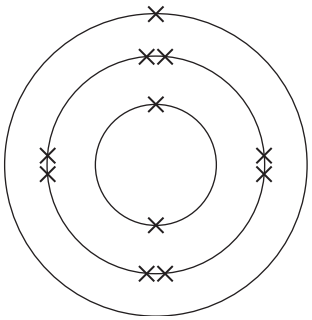
Question 03

7 Sodium chloride is a raw material.

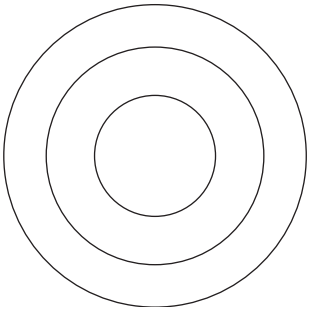
7 (a) The electronic structure of a sodium atom is shown below.

Complete the diagram for the electronic structure of a chlorine atom. A chlorine atom has 17 electrons.

Sodium atom



Chlorine atom



(1 mark)

7 (b) When sodium and chlorine react to form sodium chloride they form sodium ions (Na^+) and chloride ions (Cl^-).

How does a sodium atom change into a sodium ion?

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.....

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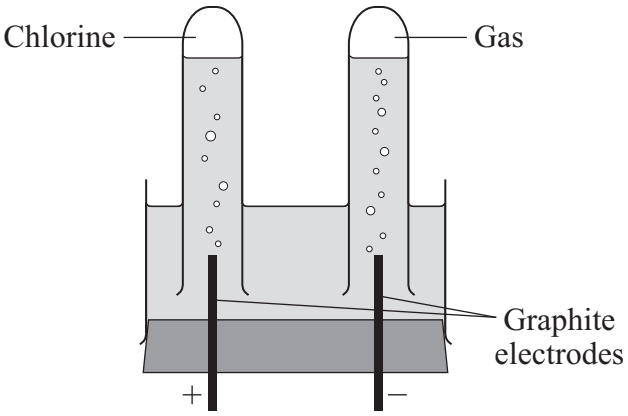
(2 marks)

4.10.1.2 Potable water

Question 03 · continued

for mark

7 (c) The diagram shows apparatus used in a school laboratory for the electrolysis of sodium chloride solution.



The solution contains sodium ions (Na^+), chloride ions (Cl^-), hydrogen ions (H^+) and hydroxide ions (OH^-).

7 (c) (i) Why do chloride ions move to the positive electrode?

.....

(1 mark)

7 (c) (ii) Name the gas formed at the negative electrode.

.....

(1 mark)

Question 7 continues on the next page

4.10.1.2 Potable water

Question 03 · continued

for mark

7 (d) Chlorine and chlorine compounds are used to bleach wood pulp that is used to make paper.

The article below is from a newspaper.

> Local people have been protesting outside a paper factory. They say:
> 'We want the company to stop using chlorine compounds. Chlorine compounds release poisons into the environment. The company should use safer compounds.'
>
> The company replied:
> 'Chlorine has been used safely for many years to treat drinking water. Only tiny amounts of chlorine are released, which cause no harm. Using other compounds will be more expensive and may put us out of business.'

7 (d) (i) Why are some local people worried about the use of chlorine compounds?

.....

.....

(1 mark)

7 (d) (ii) Why might other local people want the company to continue to use chlorine compounds?

.....

.....

(1 mark)

7 (d) (iii) It is decided to have an enquiry.
Why should this be done by independent scientists?

.....

.....

(1 mark)

8

4.10.1.2 Potable water

Question 04

January 2010 | CHY3F | Original Q5 | Legacy

5 Some people use water filters because they are concerned about the quality of drinking water.

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

5 (a) (i) One of the active chemicals in many water filters is

carbon.
magnesium.
sulfur.

(1 mark)

5 (a) (ii) In many areas of the United Kingdom the water is hard.

The hardness in water is caused by

bromide
calcium
hydrogen

ions.

(1 mark)

5 (b) Describe and give the result of a test to show that some drinking water is hard.

Test .....

.....

Result of test .....

.....

(2 marks)

5 (c) State and explain **one** benefit of drinking hard water.

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(2 marks)

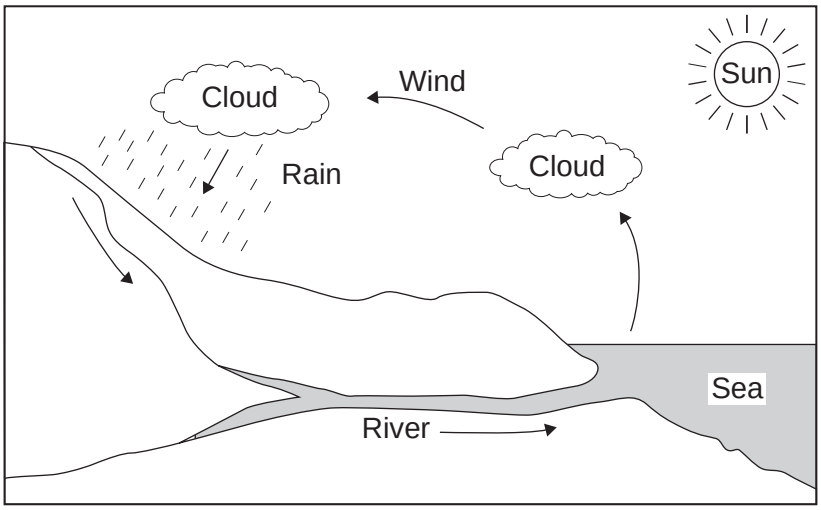
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4.10.1.2 Potable water

Question 05

June 2010 | CHY3F | Original Q2 | Legacy

2 The diagram shows part of the *Water Cycle*.



2 (a) Draw a ring around the correct answer to complete each sentence about the *Water Cycle*.

Heat from the Sun causes water in the sea to

boil.

condense.

evaporate.

This forms water vapour that rises in the atmosphere. As it rises the water vapour cools.

This forms clouds because the water vapour

boils.

condenses.

evaporates.

(2 marks)

2 (b) Suggest why sea water is **not** suitable as drinking water.

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.....

(1 mark)

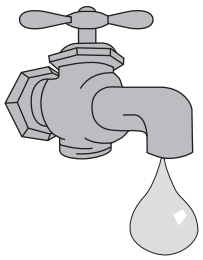
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4.10.1.2 Potable water

Question 06

6 Good quality water is essential for life.

6 (a) In the United Kingdom, water is filtered and treated with chlorine to make it safe to drink.



Explain why the water is:

filtered .....

.....

treated with chlorine. .....

.....

(2 marks)

6 (b) Millions of people in Bangladesh drink water from wells that contain high levels of arsenic. Arsenic is poisonous.

The World Health Organisation recommends that there should be no more than 0.01 mg of arsenic per litre in drinking water.

The table gives some information about two instrumental methods of testing for arsenic.

Factor to consider	Laboratory Instrumental Method	Portable Instrumental Method
Cost of equipment	£10 000	£50
Skill level of technician	Highly skilled	Little training needed
Where test is done	Laboratory only	Anywhere
Time to prepare the instrument for the test	5 minutes	10 seconds
Sensitivity of the instrument	0.000001 mg of arsenic per litre of water	0.1 mg of arsenic per litre of water

4.10.1.2 Potable water

Question 06 · continued

6 (b) (i) Use the information in the table to give **two** advantages and **one** disadvantage of using the Portable Instrumental Method compared with the Laboratory Instrumental Method.

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(3 marks)

6 (b) (ii) The information about these two instrumental methods was provided by the Professional Institute of Water Engineers (PIWE). The Institute has no connection with the companies that make these instruments.

Suggest why many people would accept the views of PIWE rather than the views of the companies that make the instruments.

.....

.....

(1 mark)

6

4.10.1.2 Potable water

Question 07

June 2012 | CH2FP | Original Q7 | Legacy

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

The salt called potassium chloride is made when potassium hydroxide solution reacts with hydrochloric acid.

potassium hydroxide solution + hydrochloric acid → potassium chloride solution + water

Describe a method for making **crystals** of potassium chloride from potassium hydroxide solution and hydrochloric acid.

In this method you should:

- describe how you will add the correct amount of the hydrochloric acid to neutralise the potassium hydroxide solution
- describe how you will get crystals of potassium chloride.

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(6 marks)

Question 7 continues on the next page

4.10.1.2 Potable water

Question 07 · continued

7 (b) Ammonium nitrate is another salt.
Ammonium nitrate is made when ammonia solution is neutralised with an acid.

Name the acid to complete the word equation.

ammonia + ... acid → ammonium nitrate

(1 mark)

7 (c) Read the information.

Ammonium nitrate – good or bad?

Some farmers put a lot of ammonium nitrate on their farmland.

Many people are worried about this use of ammonium nitrate.

Rain water can wash the ammonium nitrate off the farmland and into rivers and lakes. The ammonium nitrate may get into drinking water supplies and could be harmful to health.

7 (c) (i) Why do some farmers put ammonium nitrate on their farmland?

.....

.....

(1 mark)

4.10.1.2 Potable water

Question 07 · continued

7 (c) (ii) Which **one** of the questions in the table cannot be answered by science alone?

Tick (✓) **one** question.

Question	Tick (✓)
How much ammonium nitrate is in drinking water?	
Should farmers stop using ammonium nitrate on their farmland?	
Is ammonium nitrate soluble in rain water?	

Give **two** reasons why this question **cannot** be answered by science alone.

.....

.....

.....

.....

(3 marks)

11

4.10.1.2 Potable water

Question 08

June 2014 | CH3FP | Original Q7 | Legacy

7 Water in Britain is taken from reservoirs to use as drinking water.

Figure 9



7 (a) What are the **two** main steps used to treat water from reservoirs?

Give **one** reason for each step.

[4 marks]

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4.10.1.2 Potable water

Question 08 · continued

7 (b) Some people use water filters to treat water before drinking it.

7 (b) (i) Water filters remove hardness from hard water.

What is in water filters that removes hardness from water?

[1 mark]

.....

.....

7 (b) (ii) Suggest why water filters used in the home contain particles of silver.

[1 mark]

.....

.....

7 (c) Pure water can be produced by distillation.

Why is distillation **not** usually an economic method of treating water for drinking?

[1 mark]

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7 (d) Drinking hard water has health benefits.

State **one** health benefit of drinking hard water.

[1 mark]

.....

.....

8

4.10.1.2 Potable water

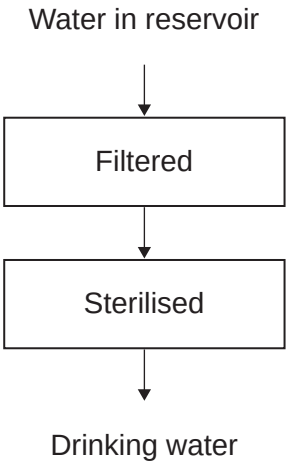
Question 09

June 2015 | CH3FP | Original Q1 | Legacy

1 This question is about drinking water.

1 (a) The flow diagram in **Figure 1** shows how water is made suitable for drinking.

Figure 1



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

[1 mark]

Tick (✓) **one** box.

Gases ☐

Liquids ☐

Solids ☐

4.10.1.2 Potable water

Question 09 · continued

1 (a) (ii) What is used to sterilise the water?

[1 mark]

Tick (✓) **one** box.

Carbon ☐

Chlorine ☐

Sodium chloride ☐

1 (a) (iii) Why is the water sterilised?

[1 mark]

.....

.....

1 (b) Water can be purified by distillation.

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

Complete the sentence.

[1 mark]

Distillation is expensive because it requires a lot of ..... .

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

[1 mark]

.....

.....

5

4.10.1.2 Potable water

Question 10

June 2017 | CH3FP | Original Q2 | Legacy

2 This question is about drinking water.

2 (a) Water in reservoirs is filtered and sterilised to make it suitable for drinking.

2 (a) (i) Draw **one** line from each treatment to the reason for the treatment.

[2 marks]

Treatment	Reason
	To add dissolved salts
Filter	To kill microbes
Sterilise	To remove solids
	To soften the water

2 (a) (ii) Which substance is used to sterilise the water?

[1 mark]

Tick (✓) **one** box.

- Ammonia ☐
- Chlorine ☐
- Limewater ☐
- Sodium carbonate ☐

4.10.1.2 Potable water

Question 10 · continued

2 (b) Pure water can be produced by distillation.

Why is distillation expensive?

[1 mark]

_____

_____

2 (c) Some water companies add fluoride to drinking water.

2 (c) (i) Give **one** benefit of adding fluoride to drinking water.

[1 mark]

_____

_____

2 (c) (ii) There is a lot of evidence to support the benefit of adding fluoride to drinking water.

Suggest why some people disagree with adding fluoride to drinking water.

[1 mark]

_____

_____

6

4.10.1.2 Potable water

Question 11

June 2019 | 8462/2F | Original Q1

0 1 This question is about drinking water.

There are two main steps in producing drinking water from fresh water.

0 1 . 1 Draw **one** line from each step to the reason for the step.

[2 marks]

Step	Reason for step
	Desalination
Filtration	Improve taste
	Increase pH
Sterilisation	Kill bacteria
	Remove solids

0 1 . 2 Which **two** substances are used to sterilise fresh water?

[2 marks]

Tick (✓) **two** boxes.

- Ammonia ☐
- Chlorine ☐
- Hydrogen ☐
- Nitrogen ☐
- Ozone ☐

4.10.1.2 Potable water

Question 11 · continued

A large amount of aluminium sulfate was accidentally added to the drinking water supply at a water treatment works.

0 1 . 3 Scientists tested a sample of the drinking water to show that it contained dissolved solids.

Which **two** methods show the presence of dissolved solids in the sample of drinking water?

[2 marks]

Tick (✓) **two** boxes.

- Add damp litmus paper to the sample. ☐
- Evaporate all water from the sample. ☐
- Measure the sample's boiling point. ☐
- Test the sample with a glowing splint. ☐

4.10.1.2 Potable water

Question 11 · continued

0 1 . 4 Scientists tested two water samples from the drinking water supply.

The scientists tested one sample for aluminium ions and the other sample for sulfate ions.

Draw **one** line from each ion to the compound needed to identify the ion.

[2 marks]

Ion	Compound needed to identify ion
	Barium chloride
Aluminium ion	Copper sulfate
	Silver nitrate
Sulfate ion	Sodium hydroxide
	Sulfuric acid

0 1 . 5 How could pure water be produced from drinking water that contained dissolved solids?

[1 mark]

Tick (✓) **one** box.

- Chromatography ☐
- Cracking ☐
- Distillation ☐
- Sedimentation ☐

9

4.10.1.2 Potable water

Question 12

November 2020 | 8462/2F | Original Q9

0 9 This question is about water.

0 9 . 1 In the UK, potable (drinking) water is produced from different sources of fresh water.

Explain how potable water is produced from fresh water.

[4 marks]

0 9 . 2 A different country has:

- very little rainfall
- a long coastline
- plentiful energy supplies.

Suggest **one** process this country could use to obtain most of its potable water.

[1 mark]

4.10.1.2 Potable water

Question 12 · continued

0 9 . 3 Waste water is not fit to drink.

Treatment of waste water produces two substances:

- liquid effluent
- solid sewage sludge.

Draw **one** line from each substance to the way the substance is processed.

[2 marks]

Substance	Process
	Aerobic biological treatment
Liquid effluent	Anaerobic digestion
	Grit removal
Solid sewage sludge	Screening
	Sedimentation

Question 9 continues on the next page

4.10.1.2 Potable water

Question 12 · continued

Table 6 shows information about the disposal of processed solid sewage sludge in the UK in 1992 and in 2010.

Table 6

Year	Mass of processed solid sewage sludge in millions of kilograms				
	Used as fertiliser	Sent to landfill	Burned	Other methods	Total
1992	440	130	90	338	998
2010	1118	9	260	26	1413

0 9 . 4 Calculate the percentage of processed solid sewage sludge that was burned in 2010.

Give your answer to 3 significant figures.

Use **Table 6**.

[3 marks]

Percentage (3 significant figures) = _____ %

4.10.1.2 Potable water

Question 12 · continued

0 9 . 5 Suggest **one** reason why the total mass of processed solid sewage sludge increased between 1992 and 2010.

[1 mark]

0 9 . 6 Between 1992 and 2010 the proportion of processed solid sewage sludge used as fertiliser increased.

Suggest **two** reasons why.

[2 marks]

1

2

13

4.10.1.2 Potable water

Question 13

November 2021 | 8462/2F | Original Q2

0 2 This question is about water.

A student investigated the concentration of salt in sea water.

This is the method used.

1. Filter the sea water to remove sand.
2. Measure the mass of an empty evaporating dish.
3. Measure 50 cm^3 of sea water into the evaporating dish.
4. Heat the evaporating dish and sea water.
5. Evaporate the sea water to dryness.
6. Measure the mass of the evaporating dish and salt.

0 2 . 1 What equipment should the student use to measure:

- the mass of the evaporating dish
- the volume of sea water?

[2 marks]

Mass of evaporating dish _____

Volume of sea water _____

0 2 . 2 **Table 2** shows the student's results.

Table 2

	Mass in g
Evaporating dish	30.44
Evaporating dish and salt	30.49

The student used 50 cm^3 of sea water.

Calculate the mass of salt in 1000 cm^3 of this sea water.

[3 marks]

Mass of salt = _____ g

0 2 . 3 The salt must be completely dry.

Which **two** extra steps are needed to show that the salt is completely dry?

[2 marks]

Tick (✓) **two** boxes.

- Filter the sea water again. ☐
- Heat the evaporating dish and salt again. ☐
- Measure the 50 cm^3 of sea water again. ☐
- Measure the mass of the empty evaporating dish again. ☐
- Measure the mass of the evaporating dish and salt again. ☐

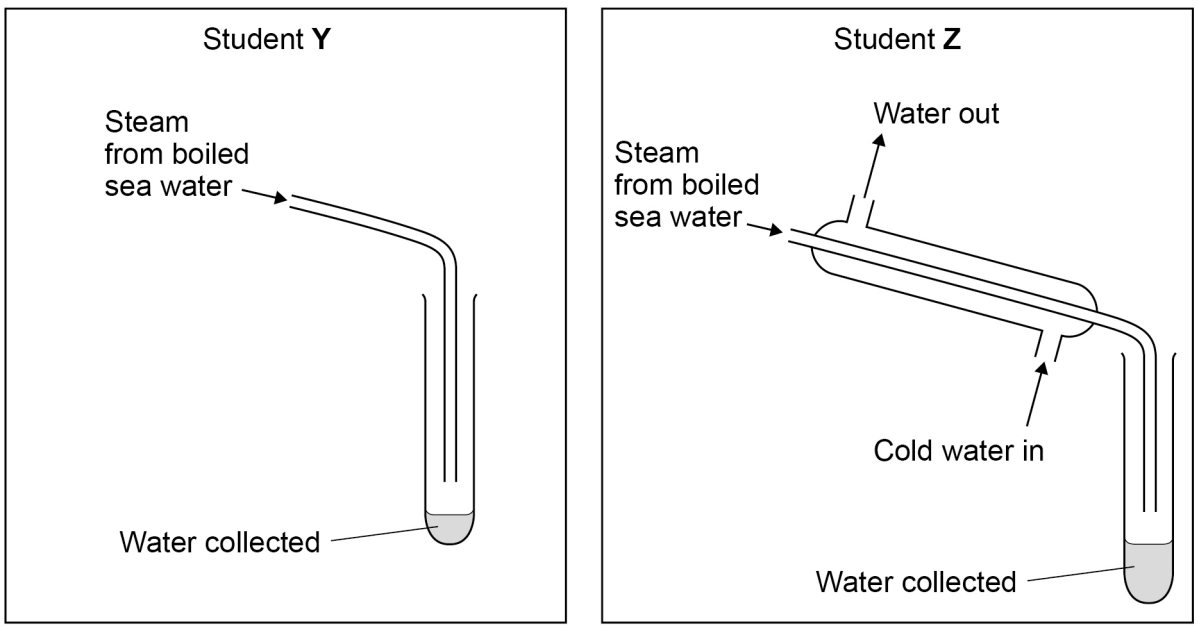
4.10.1.2 Potable water

Question 13 · continued

Two students, **Y** and **Z**, distil sea water to collect water.

Figure 1 shows the apparatus used by each student to collect the water.

Figure 1



0 2 . 4 Students **Y** and **Z** boil the same volume of sea water for the same period of time.

Explain why student **Y** collects a smaller volume of water than student **Z**.

[2 marks]

0 2 . 5 Water obtained by distillation does **not** need to be sterilised and is safe to drink.

Suggest why.

[1 mark]

4.10.1.2 Potable water

Question 13 · continued

Fresh water needs to be sterilised before it is safe to drink.

0 2 . 6 How is fresh water sterilised?

[2 marks]

Tick (✓) **two** boxes.

- Using ammonia ☐
- Using chlorine ☐
- Using chromatography ☐
- Using filtration ☐
- Using ozone ☐

0 2 . 7 A student tests the pH of fresh water using universal indicator solution.

When added to the fresh water, the colour of the universal indicator solution is green.

What is the pH of this fresh water?

[1 mark]

pH = _____

13

4.10.1.2 Potable water

Question 14

1 0 This question is about water.

1 0 . 1 Hydrogen gas reacts with oxygen gas to produce water.

Water is decomposed into hydrogen gas and oxygen gas using electricity.

Which **two** words describe the reaction between hydrogen gas and oxygen gas?

[2 marks]

Tick (✓) **two** boxes.

- Alloying ☐
- Combustion ☐
- Corrosion ☐
- Endothermic ☐
- Reversible ☐

1 0 . 2 Water molecules break down into hydrogen ions and hydroxide ions.

The equation for the reaction is:

$$H_2O \rightleftharpoons H^+ + OH^-$$

Which sentence describes this reaction at equilibrium?

[1 mark]

Tick (✓) **one** box.

- Water molecules break down at a higher rate than they reform. ☐
- Water molecules break down and reform at the same rate. ☐
- Water molecules break down at a lower rate than they reform. ☐

Question 10 continues on the next page

4.10.1.2 Potable water

Question 14 · continued

1 0 . 3 Water collected from rivers is used in the home for drinking and flushing toilets.

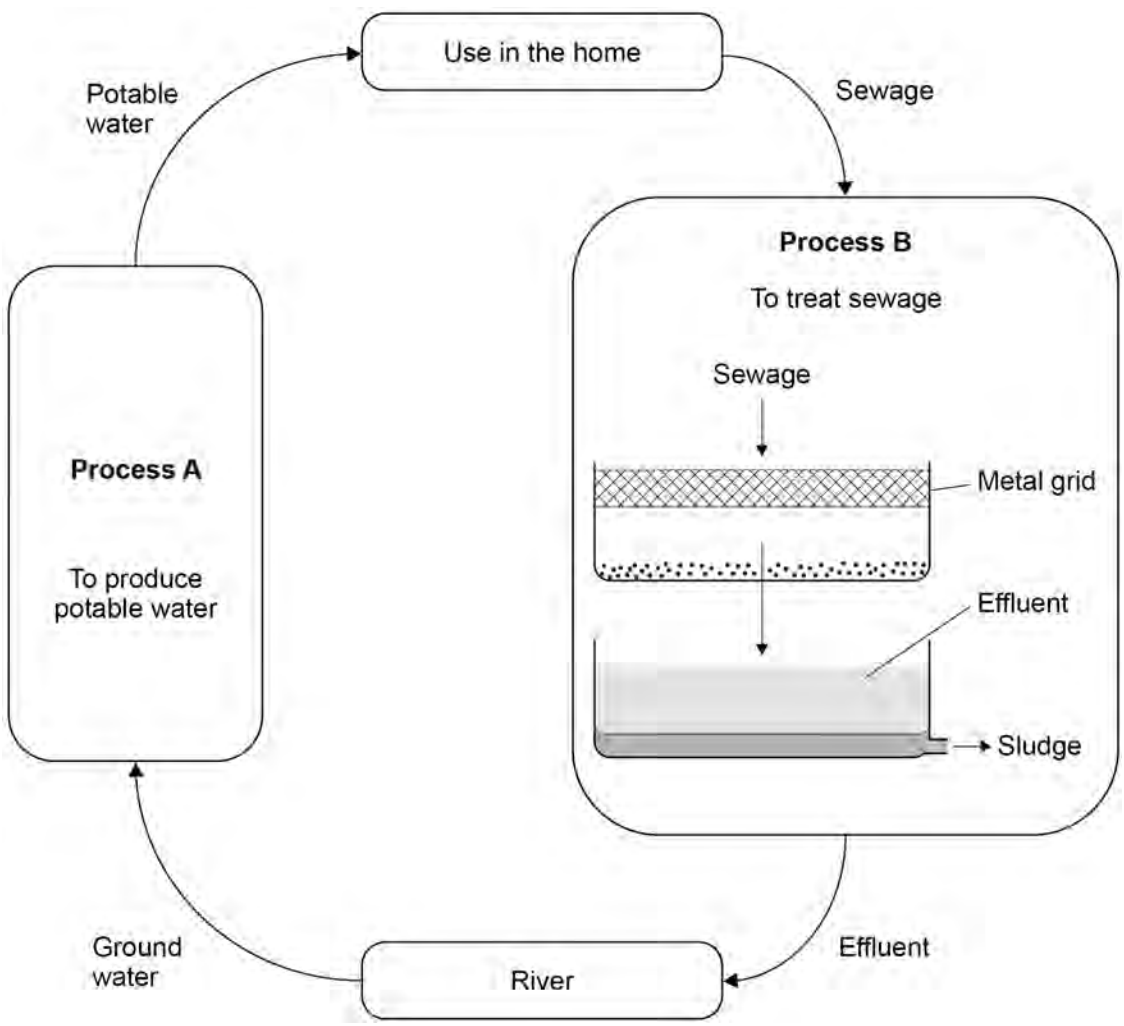
Water used in the home must be potable.

Potable water is safe to drink.

Waste water produced after use in the home is called sewage.

Figure 12 shows how water is collected from rivers and returned to rivers after use.

Figure 12



4.10.1.2 Potable water

Question 14 · continued

Explain what happens to water in **Process A** and in **Process B** in **Figure 12**.

Do **not** refer to use of water in the home.

[6 marks]

9