AQA GCSE Combined Science - Trilogy | 8464

SPECIFICATION POINT 5.10.1.2

Potable water

Past-paper questions

Tier	**Higher**
Question groups	**6**
Available paper years	**2018–2024**

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.

5.10.1.2 Potable water

Question 01

June 2018 | 8464/C/2H | Original Q3

0 3 A student investigated the mass of dissolved solids in 5 cm^3 samples of water.

Figure 3 shows the apparatus.

Figure 3

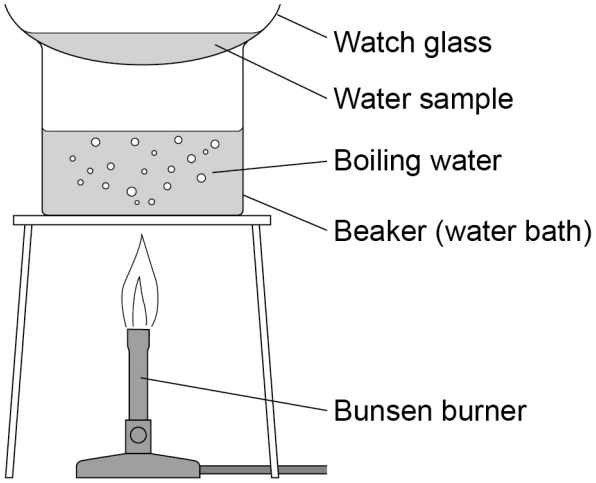


Table 2 shows the student's results.

Table 2

Type of water	Mass in g			
	Watch glass	Watch glass and dissolved solids	Dissolved solids in 5 cm^3 of water	Dissolved solids in 1000 cm^3 of water
Sea water	9.34	9.48	0.14	28.00
River water	9.15	9.23	0.08	**X**
Rainwater	8.93	8.93	0.00	0.00

0 3 . 1 Calculate mass **X** in **Table 2**

[1 mark]

Mass **X** = _____ g

5.10.1.2 Potable water

Question 01 · continued

0 3 . 2 5 cm^3 is a small volume of water for each experiment.

Give **one** advantage and **one** disadvantage of using a larger volume.

[2 marks]

Advantage _____

_____

Disadvantage _____

_____

0 3 . 3 Potable water is **not** pure water.

Describe the difference between potable water and pure water.

[1 mark]

_____

_____

_____

0 3 . 4 Potable water is obtained from both groundwater **and** from sea water.

Describe how groundwater and sea water are treated to produce potable water.

[3 marks]

_____

_____

_____

_____

_____

_____

Question 3 continues on the next page

5.10.1.2 Potable water

Question 01 · continued

0 3 . 5 The percentage by mass of dissolved solids in a 6.50 g sample is 2.2%

Calculate the mass of the dissolved solids.

[2 marks]

Mass of dissolved solids = _____ g

9

5.10.1.2 Potable water

Question 02

June 2019 | 8464/C/2H | Original Q1

0 1 Water that is safe to drink contains dissolved substances.

0 1 . 1 What do we call water that is safe to drink?

[1 mark]

Tick (✓) **one** box.

- Desalinated ☐
- Filtered ☐
- Fresh ☐
- Potable ☐

0 1 . 2 Describe a test for pure water.

Give the result of the test if the water is pure.

[2 marks]

Test _____

Result _____

_____

_____

5.10.1.2 Potable water

Question 02 · continued June 2019 | 8464/C/2H | Original Q1

0 1 . 3 Describe a method to determine the mass of dissolved solids in a 100 cm^3 sample of river water.

[4 marks]

0 1 . 4 A sample of river water contains 125 mg per dm^3 of dissolved solids.

Calculate the mass of dissolved solids in grams in 250 cm^3 of this sample of river water.

Give your answer to 2 significant figures.

[4 marks]

Mass of dissolved solids = _____ g

5.10.1.2 Potable water

Question 02 · continued

0 1 . 5 A water company allows a maximum of 500 mg per dm^3 of sulfate ions in drinking water.

A sample of drinking water contains 44 mg per dm^3 of sulfate ions.

Calculate the percentage (%) of the maximum allowed mass of sulfate ions in the sample of drinking water.

[2 marks]

Percentage (%) of the maximum allowed mass = _____ %

13

5.10.1.2 Potable water

Question 03

0 3 The methods used to produce potable water depend upon available sources of water.

0 3 . 1 Suggest how copper sulfate can be used as a test for the presence of water.

[3 marks]

The boiling point is used to check the purity of a sample of water.

0 3 . 2 In chemistry, what is meant by a 'pure substance'?

[1 mark]

5.10.1.2 Potable water

Question 03 · continued

0 3 . 3 The boiling point of a 250 g sample of water was 100.60 °C.

The boiling point of pure water in a data book is 100.00 °C.

Each 1% of impurity increases the boiling point of water by 0.12 °C.

Calculate the mass of the impurity in the sample of water.

[3 marks]

Mass of the impurity = _____ g

0 3 . 4 Explain how distillation is used to obtain potable water from salty water.

[4 marks]

Question 3 continues on the next page

5.10.1.2 Potable water

Question 03 · continued

0 3 . 5 Obtaining potable water from salty water is more expensive than obtaining potable water from ground water.

Explain why.

Refer to the processes used in both methods in your answer.

[2 marks]

13

5.10.1.2 Potable water

Question 04

0 2 . 1 Water that is safe to drink is called potable water.

Compare how easily potable water can be obtained from:

- waste water (sewage)
- ground water (fresh water).

[6 marks]

Question 2 continues on the next page

5.10.1.2 Potable water

Question 04 · continued

A scientist produced potable water from 150 cm^3 of salty water.

0 2 . 2 Which process can be used to produce potable water from salty water?

[1 mark]

Tick (✓) **one** box.

- Distillation ☐
- Electrolysis ☐
- Filtration ☐
- Sterilisation ☐

0 2 . 3 The salty water contains sodium chloride.

The scientist collected 2.40 g of sodium chloride from 150 cm^3 of salty water.

Calculate the concentration of sodium chloride in grams per dm^3

[3 marks]

Concentration of sodium chloride = _____ g/dm^3

10

5.10.1.2 Potable water

Question 05

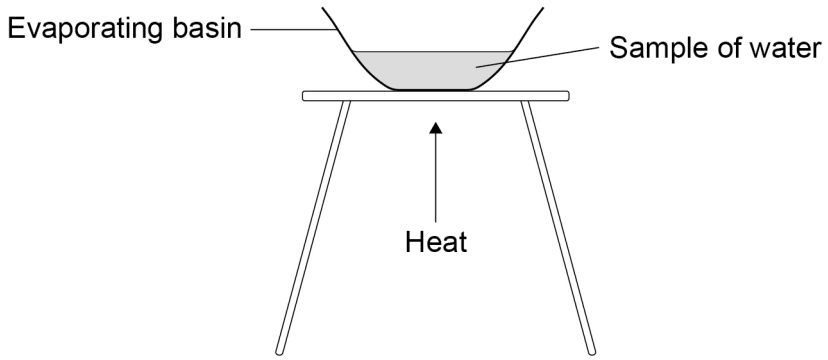
June 2023 | 8464/C/2H | Original Q4

0 4 Some types of water contain dissolved substances.

A student investigated the mass of dissolved solids in distilled water and in sea water.

Figure 1 shows the apparatus.

Figure 1



This is the method used.

1. Weigh an evaporating basin.
2. Add 20 cm^3 of distilled water to the evaporating basin.
3. Weigh the evaporating basin and the water sample.
4. Heat the water sample for 2 minutes.
5. Weigh the evaporating basin and contents.
6. Repeat steps 1 to 5 two more times.
7. Repeat steps 1 to 6 with sea water.

0 4 . 1 The method used by the student did **not** give valid results.

Describe **one** improvement the student could make to obtain valid results.

[1 mark]

A different student used a method which gave valid results.

0 4 . 2 **Table 2** shows the results.

Table 2

	Mass of dissolved solids in grams			
Type of water	**Test 1**	**Test 2**	**Test 3**	**Mean**
Distilled water	0.00	0.00	0.00	0.00
Sea water	0.30	**X**	0.26	0.29

Calculate the value **X** for the mass of dissolved solids in sea water in **Test 2**.

[2 marks]

Mass **X** = _____ g

0 4 . 3 The student concludes that distilled water is pure.

Describe a test to confirm that distilled water is pure.

[2 marks]

Test _____

Result _____

5.10.1.2 Potable water

Question 05 · continued

Tap water is potable.

A stage in the production of potable water is sterilising.

A gas is used to sterilise water.

The equation for the reaction is:

$$Cl_2(g) + H_2O(l) \rightleftharpoons HOCl(aq) + HCl(aq)$$

0 4 . 4 What is meant by the symbol ⇌?

[1 mark]

0 4 . 5 The reaction is at equilibrium.

The reaction is exothermic.

What happens to the equilibrium position when the temperature is increased?

[1 mark]

Tick (✓) **one** box.

Shifts towards the left-hand side ☐

Stays in the same place ☐

Shifts towards the right-hand side ☐

5.10.1.2 Potable water

Question 05 · continued

0 4 . 6 Describe a test to identify the gas used to sterilise water.

[2 marks]

Test _____

_____

Result _____

_____

0 4 . 7 Another stage in the production of potable water is filtering.

Explain why potable water contains dissolved solids after filtering.

[2 marks]

_____

_____

_____

_____

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5.10.1.2 Potable water

Question 06

June 2024 | 8464/C/2H | Original Q6

0 6 The Earth's natural resources are used to manufacture useful products.

One useful product is potable water.

Potable water can be produced from sea water by distillation.

0 6 . 1 Give **one disadvantage** of using distillation to produce potable water.

[1 mark]

0 6 . 2 Describe **one** other method to produce potable water from sea water.

[2 marks]

Question 6 continues on the next page

5.10.1.2 Potable water

Question 06 · continued

A student investigated the mass of dissolved solids in a 100 cm^3 sample of sea water.

This is the method used.

1. Weigh an evaporating basin.
2. Measure 100 cm^3 of sea water.
3. Pour the sea water into the evaporating basin.
4. Heat the evaporating basin.
5. Weigh the evaporating basin and contents.
6. Calculate the mass of dissolved solids in the sea water.

0 6 . 3 Explain how repeating steps 4 and 5 would improve this method.

[2 marks]

0 6 . 4 The total mass of dissolved solids in a 100 cm^3 sample of sea water is 3.50 g.

The percentage of sodium chloride in the dissolved solids is 77.8%.

Calculate the mass of sodium chloride dissolved in the 100 cm^3 sample of sea water.

[2 marks]

Mass of sodium chloride = _____ g

5.10.1.2 Potable water

Question 06 · continued

Biological methods are used to extract metal compounds from metal ores.

0 6 . 5 One method of producing copper from low-grade copper ores is by using bacteria.

The bacteria produce leachate solutions that contain copper compounds.

Give **two** methods that can be used to extract copper from these leachate solutions.

[2 marks]

1 _____

_____

2 _____

_____

Question 6 continues on the next page

Question 06 · continued

Phytomining uses plants to absorb metal compounds from low-grade ores.

0 6 . 6 Describe how the metal compounds are obtained from the plants.

[3 marks]

0 6 . 7 Nickel is produced by phytomining.

One hectare of plants produces 215 kg of nickel.

Determine the area required to produce 750 kg of nickel.

Give your answer in m^2.

One hectare = 10 000 m^2

[3 marks]

Area required = _____ m^2

15