

GCSE Combined Science: Trilogy

Worksheet: Potable water

TIME 35 min	TOTAL 32 marks	CALCULATOR Allowed	DIFFICULTY Easy, Medium
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Topics: Potable water

NAME	CLASS	DATE
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- Use black ink or black ball-point pen. Pencil should only be used for drawing.
- Answer all questions in the spaces provided.
- In all calculations, show clearly how you work out your answer.
- The marks for questions are shown in brackets.

0 1

0 1 . 1 Which process is used to sterilise water and can leave a slight taste or smell in treated tap water?

Tick (✓) **one** box.

Filtration

☐

Sedimentation

☐

Chlorination

☐

Screening

☐

[1 mark]

0 1 . 2 Give **one** method, other than using ozone, that is used to sterilise potable water.

.....

.....

[1 mark]

0 2

A student evaporates 100 cm^3 of river water to dryness in an evaporating basin.

- Mass of empty evaporating basin = 61.223 g
- Mass of basin and dry residue = 61.256 g

0 2 . 1

Calculate the mass of dissolved solids in the sample.

.....

.....

.....

Mass = g

[1 mark]

0 2 . 2

Calculate the concentration of dissolved solids in the sample, in g/dm^3 .

.....

.....

.....

.....

Concentration = g/dm^3

[2 marks]

0 3

A student analyses three water samples: tap water, river water and sea water. For each sample, the student measures the pH and finds the mass of dissolved solids in 50 cm^3 of the water. These are the steps used to find the mass of dissolved solids, in the wrong order:

- **A** Heat the basin until all of the water has evaporated.
- **B** Weigh an empty evaporating basin.
- **C** Weigh the basin and the solid left in it.
- **D** Add 50 cm^3 of the water sample to the basin.

0 3 . 1

Give **two** ways the student could measure the pH of each sample.

.....

.....

.....

.....

[2 marks]

0 3 . 2

Write the letters A, B, C and D in the correct order.

.....

.....

.....

.....

[2 marks]

0 3 . 3

Which sample would you expect to leave the greatest mass of dissolved solids?

.....

.....

.....

[1 mark]

0 3 . 4

What is meant by potable water?

.....

.....

[1 mark]

0 4

0 4 . 1

What is potable water?

.....

.....

[1 mark]

0 4 . 2

Which substance is used to sterilise drinking water?

Tick (✓) **one** box.

Carbon dioxide

☐

Chlorine

☐

Nitrogen

☐

Sodium chloride

☐

[1 mark]

0 4 . 3

Give **one** other method used to sterilise drinking water.

.....

.....

[1 mark]

0 4 . 4

Explain why potable water is **not** pure water in the chemical sense.

.....

.....

[1 mark]

0 5

0 5 . 1

Give **one** reason why sea water is not potable.

.....

.....

[1 mark]

0 5 . 2

Name the process used to remove dissolved salts from sea water to make it potable.

.....

.....

.....

.....

[1 mark]

0 6

A student evaporates 200 cm³ of tap water to dryness in an evaporating basin.

- Mass of empty evaporating basin = 59.806 g
- Mass of basin and dry residue = 59.842 g

0 6 . 1

Calculate the concentration of dissolved solids in the sample, in g/dm³.

.....

.....

.....

.....

.....

Concentration = g/dm³

[3 marks]

0 6 . 2

Explain why the student should heat, cool and reweigh the basin until its mass stops changing.

[1 mark]

0 7

A bottled water company advertises its product as '100% pure natural spring water'.

0 7 . 1

Explain why this bottled water is **not** pure in the chemical sense, even though it may be safe and pleasant to drink.

[2 marks]

0 7 . 2

Describe how a student could show that this bottled water contains dissolved solids.

[2 marks]

0 8

A student used distillation to produce pure water from sea water in the laboratory.

0 8 . 1

Describe how the student could produce a sample of pure water from sea water by distillation.

[3 marks]

0 8 . 2

The thermometer was placed where the vapour leaves the flask and enters the condenser.
Suggest why.

[1 mark]

0 8 . 3

Describe **one** test the student could do to show that the water collected is pure.
Give the result for pure water.

[2 marks]

0 8 . 4

Suggest why distillation is not used to produce drinking water on a large scale in the UK.

[1 mark]

END OF QUESTIONS

Original practice questions written to match the specification. Not produced by, affiliated with or endorsed by AQA.

Mark scheme

GCSE Combined Science: Trilogy · Worksheet: Potable water · 32 marks

Question 1 (2 marks)

01.1 [1 mark]

Correct: Chlorination

01.2 [1 mark]

- chlorine / chlorination (allow: ultraviolet light) (1)
-

Question 2 (3 marks)

02.1 [1 mark]

Answer: 0.033 g

- 0.033 (g) (1)
-

02.2 [2 marks]

Answer: 0.33 g/dm³

- volume = 100 cm³ = 0.100 dm³; 0.033 ÷ 0.100 (1)
- 0.33 (g/dm³) (1)

Notes: Allow ECF from the mass of dissolved solids.

Question 3 (6 marks)

03.1 [2 marks]

Answer: Universal indicator (with a colour chart); a pH probe (pH meter).

- universal indicator (paper or solution) and a colour chart (1)
 - a pH probe / pH meter (1)
-

03.2 [2 marks]

Answer: B, D, A, C

- B then D (first two steps correct) (1)
 - A then C (last two steps correct) (1)
-

03.3 [1 mark]

Answer: Sea water.

- sea water (1)
-

03.4 [1 mark]

Answer: Water that is safe to drink.

- water that is safe to drink (1)

Notes: Do not accept 'pure water'.

Question 4 (4 marks)

04.1 [1 mark]

- water that is safe to drink (1)
-

04.2 [1 mark]

Correct: Chlorine

04.3 [1 mark]

- ozone / ultraviolet (UV) light (1)
-

04.4 [1 mark]

- it contains dissolved substances (e.g. salts) (1)
-

Question 5 (2 marks)

05.1 [1 mark]

- it contains a very high concentration of dissolved salts, which makes it unsafe / harmful to drink (1)

05.2 [1 mark]

Answer: desalination

- desalination (1)

Notes: Allow distillation or reverse osmosis.

Question 6 (4 marks)

06.1 [3 marks]

Answer: 0.180 g/dm^3

- mass of dissolved solids = $59.842 - 59.806 = 0.036 \text{ (g)}$ (1)
- volume = $200 \div 1000 = 0.200 \text{ (dm}^3\text{)}$ (1)
- $0.036 \div 0.200 = 0.180 \text{ (g/dm}^3\text{)}$ (1)

Notes: An answer of 0.180 scores 3 marks. Allow answers correctly rounded to 3 significant figures.

06.2 [1 mark]

- to make sure that all of the water has evaporated, so the mass measured is only the dissolved solids (heating to constant mass) (1)
-

Question 7 (4 marks)

07.1 [2 marks]

- it contains dissolved substances, e.g. mineral salts, as well as water, so it is a mixture, not a single (pure) substance (1)
- 'pure' in everyday / marketing language just means nothing artificial has been added, which is a different meaning from the chemistry definition (1)

07.2 [2 marks]

- evaporate a sample of the water to dryness (e.g. in an evaporating basin) (1)
 - a solid residue is left (pure water would leave no residue) (1)
-

Question 8 (7 marks)

08.1 [3 marks]

- heat the sea water in a flask so that the water boils (1)
- the steam passes into a condenser, where it is cooled and condenses (1)
- the pure water (distillate) is collected in a beaker / flask (1)

08.2 [1 mark]

- to measure the temperature of the vapour that is being condensed and collected (1)

08.3 [2 marks]

- measure the boiling point / evaporate a sample to dryness (1)
- boils at exactly 100 °C / leaves no solid residue (1)

Notes: Allow 'measure the freezing / melting point (1); exactly 0 °C (1)'.

08.4 [1 mark]

- it requires large amounts of energy / is expensive, and the UK has enough fresh water (1)
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