

# GCSE Chemistry

## Worksheet: Potable water

|                       |                          |                              |                                   |
|-----------------------|--------------------------|------------------------------|-----------------------------------|
| TIME<br><b>30 min</b> | TOTAL<br><b>29 marks</b> | CALCULATOR<br><b>Allowed</b> | DIFFICULTY<br><b>Easy, Medium</b> |
|-----------------------|--------------------------|------------------------------|-----------------------------------|

**Topics:** Potable water

|             |              |             |
|-------------|--------------|-------------|
| <b>NAME</b> | <b>CLASS</b> | <b>DATE</b> |
|-------------|--------------|-------------|

- 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  $100 \text{ cm}^3$  of tap water to dryness in an evaporating basin.

- Mass of empty evaporating basin = 50.933 g
- Mass of basin and dry residue = 50.963 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  $\text{g/dm}^3$ .

.....

.....

.....

.....

Concentration = .....  $\text{g/dm}^3$

[2 marks]

0 3

0 3 . 1

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

.....

.....

[1 mark]

0 3 . 2

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

.....

.....

.....

.....

[1 mark]

0 4

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<sup>3</sup> 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<sup>3</sup> of the water sample to the basin.

0 4 . 1

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

.....

.....

.....

.....

[2 marks]

0 4 . 2

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

.....

.....

.....

.....

.....

[2 marks]

0 4 . 3

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

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.....

.....

[1 mark]

0 4 . 4

What is meant by potable water?

.....

.....

[1 mark]

0 5

A student evaporates 50 cm<sup>3</sup> of river water to dryness in an evaporating basin.

- Mass of empty evaporating basin = 43.249 g
- Mass of basin and dry residue = 43.273 g

0 5 . 1

Calculate the concentration of dissolved solids in the sample, in g/dm<sup>3</sup>.

.....

.....

.....

.....

.....

Concentration = ..... g/dm<sup>3</sup>

[3 marks]

0 5 . 2

Suggest why the student heats the basin gently, e.g. over a water bath, near the end of the evaporation, rather than boiling the water strongly.

.....

.....

[1 mark]

0 6

A student uses a pH probe to measure the pH of water samples. Before use, the student checks the probe by placing it in a buffer solution with a pH of exactly 7.00. Three readings in the buffer solution were 7.31, 7.30 and 7.32.

0 6 . 1

Are the readings in the buffer solution precise, accurate, both or neither?  
Explain your answer.

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[2 marks]

0 6 . 2

What type of error do these readings show?

Tick (✓) **one** box.

A random error

☐

A systematic error

☐

An anomalous result

☐

A parallax error

☐

[1 mark]

0 6 . 3

The probe gives a reading of 6.51 in a sample of river water. Assuming the same error applies, estimate the true pH of the river water.

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pH = .....

[1 mark]

0 6 . 4

Explain how the student could use the buffer solution to stop this error affecting later measurements.

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[1 mark]

0 6 . 5

Suggest why the probe should be rinsed with deionised water between samples.

.....

.....

[1 mark]

0 7

In the UK, rain provides water with low levels of dissolved substances. This fresh water collects in the ground and in lakes and rivers.

0 7 . 1

Describe how potable water is produced from fresh water in the UK.  
Give a reason for each stage.

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[4 marks]

0 7 . 2

Explain why the amount of chlorine added to drinking water must be carefully controlled.

.....

.....

.....

.....

[2 marks]

**END OF QUESTIONS**

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

# Mark scheme

## GCSE Chemistry · Worksheet: Potable water · 29 marks

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### Question 1 (2 marks)

01.1 [1 mark]

**Correct:** Chlorination

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01.2 [1 mark]

- chlorine / chlorination (allow: ultraviolet light) (1)
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### Question 2 (3 marks)

02.1 [1 mark]

**Answer:** 0.030 g

- 0.030 (g) (1)
- 

02.2 [2 marks]

**Answer:** 0.30 g/dm<sup>3</sup>

- volume = 100 cm<sup>3</sup> = 0.100 dm<sup>3</sup>; 0.030 ÷ 0.100 (1)
- 0.30 (g/dm<sup>3</sup>) (1)

**Notes:** Allow ECF from the mass of dissolved solids.

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### Question 3 (2 marks)

03.1 [1 mark]

- it contains a very high concentration of dissolved salts, which makes it unsafe / harmful to drink (1)
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03.2 [1 mark]

**Answer:** desalination

- desalination (1)

**Notes:** Allow distillation or reverse osmosis.

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## Question 4 (6 marks)

### 04.1 [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)

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### 04.2 [2 marks]

**Answer:** B, D, A, C

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

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### 04.3 [1 mark]

**Answer:** Sea water.

- sea water (1)

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### 04.4 [1 mark]

**Answer:** Water that is safe to drink.

- water that is safe to drink (1)

**Notes:** Do not accept 'pure water'.

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## Question 5 (4 marks)

### 05.1 [3 marks]

**Answer:**  $0.480 \text{ g/dm}^3$

- mass of dissolved solids =  $43.273 - 43.249 = 0.024 \text{ (g)}$  (1)
- volume =  $50 \div 1000 = 0.050 \text{ (dm}^3\text{)}$  (1)
- $0.024 \div 0.050 = 0.480 \text{ (g/dm}^3\text{)}$  (1)

**Notes:** An answer of 0.480 scores 3 marks. Allow answers correctly rounded to 3 significant figures.

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### 05.2 [1 mark]

- to stop the solid spitting out of the basin, which would make the mass of dissolved solids too low (1)
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## Question 6 (6 marks)

### 06.1 [2 marks]

**Answer:** Precise (very close together) but not accurate (all about 0.3 above the true value of 7.00).

- precise, because the readings are very close together (a range of 0.02) (1)
- not accurate, because they are all about 0.31 above the true value (7.00) (1)

**Notes:** Each mark needs the judgement and its reason.

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### 06.2 [1 mark]

**Correct:** A systematic error

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### 06.3 [1 mark]

**Answer:** 6.20

- $6.51 - 0.31 = 6.20$  (1)

**Notes:** Allow 6.2 or 6.21.

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### 06.4 [1 mark]

**Answer:** Calibrate the probe: adjust it so that it reads 7.00 in the buffer solution.

- calibrate the probe / adjust it so that it reads 7.00 in the buffer (or subtract 0.31 from every reading) (1)
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### 06.5 [1 mark]

**Answer:** So that solution from one sample does not contaminate the next sample.

- so that solution from one sample is not carried over to (does not contaminate) the next sample (1)
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## Question 7 (6 marks)

### 07.1 [4 marks]

- choose an appropriate source of fresh water (e.g. ground water, a lake or a river) (1)
- because it has low levels of dissolved substances / salts (1)
- pass the water through filter beds (1)
- to remove (insoluble) solids / particles (1)
- sterilise the water with chlorine / ozone / ultraviolet light (1)
- to kill microbes / bacteria (1)

Any 4 of the points above.

**Notes:** Each reason must be linked to the correct stage.

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### 07.2 [2 marks]

- too little chlorine would not kill all the microbes (1)
  - too much chlorine is harmful / toxic / gives the water an unpleasant taste (1)
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