



# **GCSE Chemistry**

## **Potable Water**

### **Mark Scheme**

**Time available: 60 minutes**

**Marks available: 55 marks**

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## Mark schemes

- 1.** (a) sodium chloride  
**or**  
salt  
*allow dissolved salts* 1
- (b) expensive 1
- (c) to remove solids 1
- (d) to sterilise the water  
*allow to kill microorganisms* 1
- (e) test: (damp) litmus paper 1  
  
result: bleached  
**or**  
turns white 1
- (f) pH: 7.0 1  
  
mass of dissolved solid: 0.0 (g) 1
- (g) 0.05 g 1
- (h) did not immerse the thermometer (bulb) 1
- [10]**
- 2.** (a) filtration  
**or**  
by passing through filter beds to remove solids 1  
  
sterilisation to kill microbes  
*allow chlorine / ozone allow ultraviolet light* 1
- (b) water needs more / different processes 1

because it contains any **two** from:

- more organic matter
- more microbes
- toxic chemicals or detergents

2

- (c) (as part of glassware attached to bung)  
salt solution in (conical) flask

*allow suitable alternative equipment, eg boiling tube*

1

(at end of delivery tube)

pure water in test tube which must not be sealed

*allow suitable alternative equipment, eg, beaker, condenser*

1

heat source (to heat container holding salt solution)

1

*if no other mark obtained allow for 1 mark suitable equipment drawn  
as part of glassware attached to bung **and** at end of delivery tube*

- (d) determine boiling point

1

should be at a fixed temperature 100°C

*allow should be 100°C*

*allow if impure will boil at a temperature over 100°C*

1

- (e) high energy requirement

1

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3.

- (a) (i) Solids

1

- (ii) Chlorine

1

- (iii) kill microbes / bacteria

*allow to make the water safe to drink*

*ignore disinfect*

*ignore remove / get rid of microbes*

1

- (b) energy

*allow heat*

1

(c) improve dental health

*allow reduce tooth decay*

*allow (local) government requirement*

*allow help teeth*

4.

(a) filter

1

to remove solids **or** *insoluble particles*

**OR**

*add coagulant (1)*

*flocculation / settling / remove solids (1)*

1

*(add) chlorine*

*accept ozone / UV*

1

*to reduce the number of microbes*

*accept to kill microbes / bacteria / germs*

*accept sterilise*

*allow disinfect*

*ignore remove microbes*

1

(b) (i) ion exchange resin

*allow ion exchange column*

*allow sodium ions / Na<sup>+</sup>*

*allow hydrogen ions / H<sup>+</sup>*

1

(ii) prevent growth of microbes

*accept sterilise*

*accept to kill microbes / bacteria / germs*

*accept to reduce the number of microbes*

*ignore remove microbes*

1

(c) high cost of energy / *heating*

*allow uses a lot of energy*

1

(d) any **one** from:

- helps to develop / maintain bones

*allow any suitable positive effect on bones*

- helps to develop / maintain teeth

*allow any suitable positive effect on teeth*

- reduces heart disease

1

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5.

(a) (i) distillation

1

- (ii) 100 / one hundred 1
- (b) (i) measuring cylinder **or** pipette **or** burette 1  
*allow phonetic spelling*  
*do **not** accept teat pipette*  
*ignore any additional words or volumes*
- (ii) (re)heat the evaporating basin 1  
*accept heat to constant mass for **2** marks*
- weigh (again) **or** mass will not change 1  
*if no other mark awarded allow **1** mark for a chemical test for water*
- (iii) 33.2 (g) 2  
*correct answer with or without working scores **2** marks*  
*allow mass of residue = (24.04 g - 23.21 g) = 0.83 for **1** mark*  
*allow ecf (mass of residue × 40) for **1** mark*
- (c) to kill microbes / bacteria **or** to sterilise / disinfect water 1  
*allow to prevent disease*  
*ignore 'to make it safe to drink'*

(d) Marks awarded for this answer will be determined by the Quality of Communication

**0 marks**

No relevant content

**Level 1 (1 – 2 marks)**

A simple relevant comment has been made on the data from at least one of the graphs.

**Level 2 (3 – 4 marks)**

At least two of the graphs have been considered with a relevant comment made.

**Level 3 (5 – 6 marks)**

All the graphs have been considered and relevant comments made about each. A justified conclusion may be given.

**examples of chemistry points made in the response:**

***extra information***

- (graph 1 shows) fluoride ions reduce the amount of tooth decay
- (graph 1 shows) the effect in reducing tooth decay is greatest for 55–64 year olds  
*accept any in range 55 – 64*
- (graph 2 shows) the fluoride ions reduce percentage with decayed teeth
- (graph 2 shows) effect is greatest at 2.5 to 3 mg per 1000 g of water then decay increases if more than 2.5 to 3 mg of fluoride ions per 1000 g water  
*accept any in range 2.5 – 3*
- (graph 2 shows percentage) decay decreases from 0 to 2.5 / 3 mg per 1000 g
- (graph 3 shows) more marked / brittle teeth as fluoride level increases
- above points linked together to draw a justified conclusion

6

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6.

(a) sterilise / disinfect (water)

*ignore removes bacteria / impurities / disease*

**or**

kill bacteria / micro-organisms / microbes / germs / pathogens

*ignore cleans the water / makes (water) safe*

*allow destroy bacteria or gets rid of bacteria*

1

(b) any **two** from:

*ignore reference to safe / unsafe*

- chlorine is toxic / poisonous
- so (too much) will be dangerous / harmful / kill people / cause illness / health problems
  - allow causes damage*
- cause breathing difficulties **or** cause (more) allergic reactions / skin **or** eye irritation
- too little will not kill bacteria
  - allow bacteria still there*

2

(c) cheap / easy / quick to use (process)

*accept prevents typhoid / cholera*

*ignore reference to specialists or equipment*

1

(d) (i) fair / more ideas / views / opinions **or** less chance of bias **or** more democratic

*allow idea of different points of view / balanced view*

*allow avoids undue influence owtte*

1

(ii) (more likely) to have support / influence / convince people

*ignore well respected*

*allow ideas about trust eg people will have more confidence in their views / more likely to be believed*

*allow ideas about expertise eg more likely to know what they are talking about / have done experiments / tests*

*allow have knowledge / understanding*

*allow (more) reliable*

1

(iii) (more likely) to be correct / less likely to be incorrect

*owtte*

**or**

reliable / factual / accurate / based on proof / based on experiments or tests / based on validation

*ignore based on evidence unqualified*

*allow hearsay / opinion can be biased*

1

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