

# MARK SCHEME

# GCSE

## CHEMISTRY

## AQA - COMBINED SCIENCE

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C10 - TEST 3  
USING RESOURCES  
Intermediate

## Mark schemes

1.

- (a) (i) distillation 1
- (ii) 100 / one hundred 1
- (b) (i) measuring cylinder **or** pipette **or** burette  
*allow phonetic spelling*  
*do **not** accept teat pipette*  
*ignore any additional words or volumes* 1
- (ii) (re)heat the evaporating basin  
*accept heat to constant mass for 2 marks* 1
- weigh (again) **or** mass will not change  
*if no other mark awarded allow 1 mark for a chemical test for water* 1
- (iii) 33.2 (g)  
*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* 2
- (c) to kill microbes / bacteria **or** to sterilise / disinfect water  
*allow to prevent disease*  
*ignore 'to make it safe to drink'* 1

- (d) Marks awarded for this answer will be determined by the Quality of Communication (QoC) as well as the standard of the scientific response. Examiners should also refer to the information on page 4, and apply a 'best-fit' approach to the marking.

**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

[14]

2.

- (a) Safe to drink

1

- (b) To remove undissolved solids

1

- (c) the gas is chlorine / Cl<sub>2</sub>

1

which sterilises water

1

- (d) as distance between steel increases strength of concrete decreases

1

change above and change below 1.0 cm separation is compared and described

*must refer to graph values for this mark*

1

[6]

3.

- (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

[8]

4.

Marks awarded for this answer will be determined by the Quality of Written Communication (QWC) as well as the standard of the scientific response. Examiners should apply a 'best-fit' approach to the marking.

**0 marks**

No relevant content.

**Level 1 (1–2 marks)**

A brief reason is given against extraction or for recycling. There is little scientific terminology used.

**Level 2 (3–4 marks)**

Some reasons are given with clear statements against extraction and or for recycling. Some scientific terminology is used

**Level 3 (5–6 marks)**

Several reasons are given with a detailed explanation against extraction and for recycling. Scientific terminology is used accurately

## examples of chemistry points made in the response

*ignore uses and properties of aluminium. Comparative statements count for both methods*

extraction:

- limited resources of aluminium oxide
- higher temperatures required  
*allow quoted temperatures eg extracted at 950°C*
- large amount of energy required
- expensive
- requires mining / quarrying
- process takes longer / has more stages
- produces more carbon dioxide / greenhouse gases

recycling:

- saves resources
- cheaper to recycle
- uses less energy
- only needs to be melted  
*allow quoted temperatures eg melted / recycled at 700°C*
- less electricity needs to be *used*
- less effect on environment
- example of *effect on environment*  
*eg less destruction of habitats*
- avoids need for disposal / use of landfill
- no need for quarrying
- sustainable

6

[6]

5.

Marks awarded for this answer will be determined by the Quality of Written Communication (QWC) as well as the standard of the scientific response.

No relevant content.

0 marks

There is a brief description of a positive and a negative environmental impact involved with one or more methods used to reduce the amount of plastic bags sent to landfill.

Level 1 (1–2 marks)

There is some description of both positive and negative environmental impacts involved with at least 2 methods used to reduce the amount of plastic bags sent to landfill.

Level 2 (3–4 marks)

There is a clear, balanced and detailed description of both a positive and a negative environmental impact of using each of the 3 methods used to reduce the amount of plastic bags sent to landfill.

Level 3 (5–6 marks)

### examples of the points made in the response

#### Reuse:

Reuse means less bags used so:

Positive environmental impact

- Saves raw materials/crude oil
- Saves energy
- Cuts down on CO<sub>2</sub> emissions
- Less global warming

Negative environmental impact

- Could cause litter
- Could still be sent to landfill

**Recycle:**

Bags can be recycled so:

Positive environmental impact

- Used to make new plastic bags / objects
- Saves raw materials / crude oil
- Saves energy compared to producing plastic bags from crude oil
- Cuts down on CO<sub>2</sub> emissions
- Less global warming

Negative environmental impact

- Collection point sites cause an eyesore / litter problem
- Transportation to recycling plant releases carbon dioxide / causes global warming

**Burn:**

Bags can be burned so:

Positive environmental impact

- Could provide energy for heating buildings
- Could provide energy for generating electricity

Negative environmental impact

- Increases CO<sub>2</sub> emissions
- Increases global warming
- Could release toxic gases
- Does not conserve raw materials / crude oil

[6]

6.

(a) because the traditional method of extraction produces large amounts of solid waste

1

because the traditional method of extraction would cause atmospheric pollution due to the release of carbon dioxide / sulphur dioxide

1

(b) (i) because iron is cheap

*accept because iron is much more abundant than copper*

1

(ii) iron is more reactive than copper

1

therefore iron displaces copper from solutions of  
its salts / copper sulfate solution

1

**[5]**