

Using Earth's res, Potable Water

Mark Scheme

Level	GCSE (9-1)
Subject	Combined Science: Trilogy - Chemistry
Exam Board	AQA
Topic	5.10 Using Resources
Sub-Topic	Using Earth's res, Potable Water
Difficulty Level	Silver Level
Booklet	Mark Scheme

Time Allowed: 56 minutes

Score: /55

Percentage: /100

Grade Boundaries:

- M1.(a)** 4 (C₂H₄) 1
- (b) cracking involves a catalyst 1
- distillation does not
- or**
- distillation does not involve a chemical change
- but cracking does 1
- (c) Decomposition 1
- (d) **Level 3 (5–6 marks):**
A logically structured evaluation with links involving several comparisons. Nearly all points made are relevant and correct.
- Level 2 (3–4 marks):**
Some valid comparisons made between the two types of bag. There may be some incorrect or irrelevant points.
- Level 1 (1–2 marks):**
A vague response with few correct and relevant points and with no direct comparisons.
- 0 marks:**
No relevant content
- Indicative content**
- Accept converse in terms of plastic bags for all statements
- Paper bags are made from a renewable resource
 - Plastic bags are made from a finite resource
 - Paper bags require more energy to manufacture
 - Paper bags produce more waste
 - Paper bags are biodegradable
 - Paper bags create more CO₂
 - CO₂ created by paper bags offset by photosynthesis in growing wood

- Paper bag requires much more fresh water
- Paper bags cannot be recycled
- Agree because non-renewability less important than other factors **or** disagree because of converse **or** can't say because data inconclusive / incomplete

6

[10]

M2.(a) Safe to drink

1

(b) To remove undissolved solids

1

(c) the gas is chlorine / Cl_2

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]

M3.(a) Level 2 (3–4 marks):

A detailed and coherent explanation of how the water molecules transfer through the water cycle from one form / area to another. Logical links are made between the general details of the water cycle to the context of the iceberg.

Level 1 (1–2 marks):

Simple relevant facts stated about the water cycle. Details may be missing and any links made with the context of the iceberg may be inconsistent or vague.

0 marks:

No relevant content.

Indicative content

- water in the iceberg is in its solid state
- when the iceberg melts water is in its liquid form
- and the water molecules go into the sea
- water evaporates from the surface of the sea
- so the water molecules go into the air as vapour
- as the air rises it cools
- so water vapour condenses into droplets in clouds
- clouds can be moved around the world by winds
- droplets then fall as rain / snow / hail / precipitation
- into a lake

4

(b) solid materials

1

removed by filtration **or** by passing through filter beds

1

microbes

1

are killed by sterilisation

1

allow killed by chlorine / ozone / ultraviolet light

[8]

M4.(a) (i) phytomining

1

(ii) (the land contains) very little copper
*allow low grade ore **or** large amounts of waste*
ignore quarrying / benefits of using plants

1

uneconomical

accept (smelting) uses a lot of energy / fossil fuels

allow expensive

1

(iii) Cu

1



allow 2 CuO + C → Cu₂ + CO₂ for 1 mark

1

(b) (i) iron is more reactive (than copper)

1

iron is cheap(er than copper)

*allow cheaper **or** uses less energy than electrolysis*

1

(ii) any **two** from:

- copper / ions move **or** are attracted to the negative electrode / cathode
- where they are reduced **or** gain (two) electrons
- where they form copper (metal / atoms)

2

[9]

M5.(a) filter

1

to remove solids **or** insoluble particles

OR

add coagulant (1)

	flocculation / settling / remove solids (1)	1
	(add) chlorine <i>accept ozone / UV</i>	1
	to reduce the number of microbes <i>accept to kill microbes / bacteria / germs</i> <i>accept sterilise</i> <i>allow disinfect</i> <i>ignore remove microbes</i>	1
(b)	(i) ion exchange resin <i>allow ion exchange column</i> <i>allow sodium <u>ions</u> / Na⁺</i> <i>allow hydrogen <u>ions</u> / H⁺</i>	1
	(ii) prevent growth of microbes <i>accept sterilise</i> <i>accept to kill microbes / bacteria / germs</i> <i>accept to reduce the number of microbes</i> <i>ignore remove microbes</i>	1
(c)	high cost of energy / <i>heating</i> <i>allow uses a lot of energy</i>	1
(d)	any one from: • helps to develop / maintain bones <i>allow any suitable positive effect on bones</i> • helps to develop / maintain teeth <i>allow any suitable positive effect on teeth</i> • reduces heart disease	1
		[8]
M6.(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]