

MARK SCHEME

GCSE

CHEMISTRY

AQA - COMBINED SCIENCE

C10 - TEST 4
USING RESOURCES
Intermediate

Mark schemes

1.

- (a) filtered: removes insoluble / solid

Ignore named substances / minerals
*do **not** accept ions*

1

chlorine: kills microorganisms / microbes / bacteria / disinfects (water)

*allow kills germs / pathogens **or** sterilises*

allow chlorine is a disinfectant

ignore cleans water or removes impurities / bacteria

1

- (b) (i) advantages of portable:

accept converse throughout

any **two** from :

- costs less
- little training needed
- water can be tested within 10 seconds / immediately / quicker
- can be used anywhere

2

disadvantage of portable

less precise / sensitive

allow only detect down to 0.1 mg

ignore less accurate

1

- (ii) (PIWE) is unbiased

it / they = PIWE

allow honest / trusted / respected / reliable

ignore professional / scientific / skilled

or

company may be biased

allow company trying to sell products

1

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2.

- (a) (i) reduction

accept redox / smelting

1

- (ii) 3 4 3

1

(b) (i) 55

ignore other units

(ii) Water

accept sodium hydroxide

accept correct formulae H_2O or $NaOH$

1

(iii) any **one** from:

- save energy / fuel for transporting the ore
accept less (cost of) transport allow transported quickly
- (old) quarries nearby for waste/red mud

1

(c) **Environmental**

any **one** from:

- less mining / quarrying (of bauxite)
allow loss of habitat / less qualified noise pollution
- less landfill space needed / used
allow less red mud / waste
- less use of fossil fuels / energy
- less carbon dioxide produced

1

Ethical or social

any **one** from:

- saves resources
allow using resources more than once
- creates (local) employment
if answers reversed and both correct award 1 mark
- more people aware of the need for recycling
allow less qualified noise pollution if not given in environmental

1

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3.

(a) any **two** from:

- copper / ores are running out / harder to find
- there are no / very small amounts of high-grade copper ores left
- copper metal is in demand
- copper is expensive
- now economical to extract copper from low-grade ores
it = copper
allow new methods of extraction e.g. bioleaching and phytomining
allow high-grade ores are running out for 2 marks

2

(b) (i) large amounts / 98% of rock to dispose of as waste

accept contains toxic (metal) compounds / bioleacher

or

waste rock takes up a lot of space

1

(ii) (copper sulfide reacts with oxygen to) produce sulfur dioxide / SO_2

allow (sulfur reacts with oxygen to) produce sulfur dioxide / SO_2

1

that causes acid rain

*allow description of effects of acid rain **or** sulfur dioxide*

*if no other mark awarded allow CO_2 produced which causes global warming **or** CO_2 produced by burning fuel or heating the furnace for 1 mark*

1

(iii) any **one** from:

- large amounts of fuels / energy used (for the furnace and electrolysis)
allow large amounts of electricity needed
ignore high temperature / electrolysis unqualified
- (the extraction has) many steps / stages / processes
allow (extraction) is a long process / takes a lot of time
- large amounts of ore / material have to be mined
allow ores contain a low percentage of copper

1

(iv) (copper ions move towards) the negative electrode / *cathode*

1

because copper ions / Cu^{2+} are positively charged **or** are oppositely charged **or** copper ions need to gain electrons

*allow because metal ions are positive **or** opposites attract*

1

(v) (growing) plants

1

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4.

(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 $2 \text{CuO} + \text{C} \rightarrow \text{Cu}_2 + \text{CO}_2$ 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

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5.

(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]

6.

(a) any **three** from:

- resources / aluminium / ores are conserved
accept converse argument
- less / no mining **or** less associated environmental problems
eg quarrying / eyesore / dust / traffic / noise / loss of land / habitat
ignore just pollution
- less / no waste (rock) / landfill
*do **not** accept 'wastes 50% of the ore'*
- no purification / separation (of aluminium oxide)
- (aluminium extraction / production) has high energy / electricity / heat / temperature requirements
- less carbon dioxide produced
accept no carbon dioxide produced
ignore references to cost

3

(b) statement

ignore density

1

linked reason

eg

(pure) Al / it is weak / soft (1)

as layers / rows can slide (over each other) (1)

or

alloy / other metals / they make it stronger / harder (1)

stops layers / rows sliding over each other (1)

accept disrupts the structure owtte if no other mark awarded

*accept to form an alloy **or** to change properties for 1 mark*

1

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