

M1.(a) (i) Filtration

1

(ii) Chlorine

1

(b) (i) nanoparticles are small / smaller / much smaller / tiny

allow any in range 1–100 nm or $1 \times 10^{-9} \text{ m} - 1 \times 10^{-7} \text{ m}$ or a few hundred atoms in size

ignore numbers if stated smaller

1

(ii) they have a high surface area to volume ratio

reference to surface area without volume ratio is insufficient

allow nanoparticles are very reactive or nanoparticles are more reactive than normal particles.

1

(c) (sodium hydroxide) produces a white precipitate

accept solid / suspension or ppt or ppte for precipitate.

ignore cloudy / milky

1

which (then) dissolves / disappears (in excess sodium hydroxide)

M2 cannot be awarded unless a solid of some sort has been made

ignore names or formulae of compounds

1

[6]

M2.(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

1

[5]

- M3.(a) (i) Solids 1
- (ii) Chlorine 1
- (iii) improves dental health **or** reduces tooth decay 1
- (b) put a sample of the filtered water in an evaporating basin **or** leave to evaporate
accept any description of evaporation (using a Bunsen or leaving on the windowsill) 1
- there will be crystals of salt left 1
- (c) sodium and / or chloride ions are bigger than water (molecules) **or** ions are charged
or molecules are not charged
*do **not** accept sodium chloride molecules as ions is given in the question* 1
- [6]**

M4.(a)	(i)	economical	1
	(ii)	phytomining	1
	(iii)	carbon dioxide	1
(b)	(i)	copper / Cu	1
		iron sulfate / FeSO ₄	1
	(ii)	copper / ions have a positive charge <i>it = copper ions</i> <i>allow copper ions have a different charge</i> <i>accept copper / ions are free to move</i> <i>accept to gain electrons</i> <i>accept copper / ions are attracted to the negative electrode or</i> <i>opposite charges attract</i>	1

(c) any **two** from:

ignore not biodegradable or does not decay

- copper ores are limited / running out
- copper can be recycled
- copper can be reused
- copper is expensive
- landfill sites are filling up
- copper compounds are toxic

allow copper is toxic

2

[8]

M5. (a) contains (large amounts of) dissolved solids / difficult to remove dissolved solids
allow salty / too much salt
allow sea water makes you thirsty / vomit
allow polluted / untreated / contaminated

1

(b) filtered: removes solids / removes insoluble material / dirt
ignore large objects

1

chlorine: kills/destroy bacteria/microbes/ germs etc
allow disinfect / sterilise or gets rid of bacteria
ignore purify / clean

1

[3]