

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<sub>4</sub>

1

(ii) copper / ions have a positive charge

*it = copper ions*

*allow copper ions have a different charge*

*accept copper / ions are free to move*

*accept to gain electrons*

*accept copper / ions are attracted to the negative electrode **or***

*opposite charges attract*

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]