M1.(a) any **one** from:

- protection / improve lifespan
- improve appearance.

1

(b) (i) Bleach

1

(ii) Hydrogen is less reactive than sodium

1

(iii) 1 bonding pair of electrons 6 unbonded electrons on Cl

accept dot, cross or e or – or any combination

1

(iv) Covalent

1

(v) Hydrogen chloride has a low boiling point.

1

Hydrogen chloride is made of simple molecules.

1

(c) (i) oxygen

accept carbon dioxide

1

(ii) aluminium ions are positive

1

so are attracted (to the negative electrode)

allow opposites attract

1

(iii) Reduction

1

(iv) slide

allow move

1

(d) (i) C

1

(ii) strong covalent bonds

1

[14]

M2.(a) (i) was well qualified

1

(ii) check the results of the experiment

1

(b) (i) cannot move

1

(ii) melt it / make it a liquid

allow heat it

allow dissolve (in water) / make a solution

1

(iii) they are positive

*allow opposites attract **or** opposite charges*

1

(iv) atoms

1

[6]

M3. (a) reduction

1

(b) carbon is less reactive than aluminium

1

(c) aluminium (ions) / they are positively charged

they = aluminium ions

ignore particle names

accept aluminium (ions) / they are cations

allow aluminium (ions they have an opposite charge

1

so they are attracted **or** they move towards the negative electrode

OR

aluminium (ions) / they need to gain electrons (1)

which come from the negative electrode (1)

*if no other marks awarded allow 'opposites attract' for **1** mark*

1

(d) aluminium has a low density

1

aluminium is resistant to corrosion

1

(e) **advantage** less carbon dioxide is produced

1

disadvantage used aluminium cans have to be collected and transported

1

[8]

M4. (a) (i) A

1

(ii) E

1

(b) (i) insoluble

precipitation

2

(ii) filtration

*accept decant **or** centrifuge*

1

(iii) hydrochloric acid

1

(c) (i) melt

allow add to / dissolve in water
allow heat until liquid
allow turn it to liquid / make it molten
ignore heat

1

(ii) they are positive

or

opposite charges **or** opposites attract

*do **not** accept electrodes attracting*
*do **not** accept positive electrons*

1

(iii) chlorine

accept Cl_2

*do **not** accept chloride*

1

[9]

M5. (a) (i) cryolite

1

(ii) lower the melting point of the aluminium oxide

1

(b) (i) opposite charges **or** oxide ions are negative

1

attract

1

(ii) carbon

1

(iii) <u>reacts</u> with oxygen **or** forms carbon dioxide

accept burns

1

(c) **Structure mark:**

either Al (atoms) in layers / rows

accept Al (atoms) all the same size
allow Al (atoms) in lines

or alloy (atoms) not in layers / rows

accept different sizes of atoms in alloy
allow alloy (atoms) not in lines

1

Sliding mark:

either so (Al layers) can slide

or so (alloy) layers cannot slide

1

[8]

M6. (a) cannot move

1

(b) water

1

(c) (i) a positive charge

1

(ii) atoms

1

[4]

M7. (a) covalent

1

(b) (i) liquid

1

(ii) fluorine

accept F / F_2

*do **not** accept fluoride*

1

(c) (i) should fluoride ions be added to drinking water?

1

(ii) any **one** from:

- not enough reliable/valid evidence
- may be other factors involved
- it is an opinion / choice / belief / ethics issue
- it can't be scientifically investigated

allow can't do an experiment

ignore test

mark independently of (c) (i)

1

[5]

M8. (a) (i) ionic

1

(ii) elements

1

(b) (i) chlorine (gas)

allow Cl_2 / Cl / Cl^2

allow chloride

1

(ii) hydrogen (gas)

allow H / H_2 / H^2

1

(iii) sodium hydroxide (solution)

allow NaOH

allow sodium solution

1

[5]