

- 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

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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

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<sub>2</sub>*

*do **not** accept chloride*

1

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- 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) reacts 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<sub>2</sub>*  
*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) 1  
*allow Cl<sub>2</sub> / Cl / Cl<sup>-</sup>*  
*allow chloride*
- (ii) hydrogen (gas) 1  
*allow H / H<sub>2</sub> / H<sup>+</sup>*
- (iii) sodium hydroxide (solution) 1  
*allow NaOH*  
*allow sodium solution*

[5]