| Question Number | Answer | Acceptable answers | Mark |
|---|---|---|---|
| 1(a)(i) | an explanation linking the following<br><br>• decomposition (of compound/substance /electrolyte)(1)<br><br>• using (direct) current (1) | splitting up/breaking down/breaking up<br><br>ignore separating<br><br>reject splitting of atoms/elements/molecules for M1<br><br>using {electrical energy /electricity}<br><br>reject alternating current/ac | (2) |

| Question Number | Answer | Acceptable answers | Mark |
|---|---|---|---|
| 1(a)(ii) | • (damp blue) litmus (paper) (1)<br><br>• (turns red then) {bleaches / goes white} (1) | allow bleaches indicator for 1 mark<br><br>ignore indicator goes lighter<br>ignore smells of chlorine/swimming pools<br>ignore any incorrect middle colour mentioned<br><br>use of suitable named indicator with correct result<br>e.<br>(damp) universal indicator paper (1)<br>(turns red then) bleaches (1)<br><br>starch-iodide paper(1)<br>turns blue-black(1) | (2) |

| Question Number | Answer | Acceptable answers | Mark |
|---|---|---|---|
| 1(a) (iii) | poly(chloroethene) | PVC/polyvinylchloride/ polychloroethene/poly(chlorethene) | (1) |

| Question Number | Answer | Acceptable answers | Mark |
|---|---|---|---|
| 1(b)(i) | D AgCl(s) | | (1) |

| Question Number | Answer | Acceptable answers | Mark |
|---|---|---|---|
| 1(b)(ii) | same/no change | | (1) |

| Question Number | Answer | Acceptable answers | Mark |
|---|---|---|---|
| 1(b)(iii) | $HCl + AgNO_3 \rightarrow AgCl + HNO_3$<br>• reactant formulae (1)<br>• product formulae (1) | $Ag^+ + Cl^- \rightarrow AgCl$<br>max 1 if any incorrect attempt to balance<br>reject incorrect use of cases and non-subscripts | (2) |

| Question Number | Answer | Acceptable answers | Mark |
|---|---|---|---|
| **2(a)(i)** | B $H^+$ and $Na^+$ ions | | **(1)** |

| Question Number | Answer | Acceptable answers | Mark |
|---|---|---|---|
| **2(a)(ii)** | An explanation linking<br>• electron(s) (1)<br>• (have been) lost/removed (1) conditional on electrons | ignore reference to number of electrons<br>do not allow negative charge<br>chlorine gains electrons (0)<br>allow chlorine loses electrons (1) | **(2)** |

| Question Number | Answer | Acceptable answers | Mark |
|---|---|---|---|
| **2(a)(iii)** | Any one from<br>• it contains (excess) {hydroxide/$OH^-$} ions (1)<br>• {sodium/$Na^+$} ions and {hydroxide/ $OH^-$} ions remain (1)<br>• it is sodium hydroxide/NaOH (1)<br>• {hydrogen/$H^+$} ions have been removed (at the cathode) (1) | ignore solution has pH greater than 7<br>allow no hydrogen ions left/acidic **ions** removed | **(1)** |

| Question Number | Answer | Acceptable answers | Mark |
|---|---|---|---|
| **2(a)(iv)** | use {molten/liquid} {sodium chloride /electrolyte} / melt {it/sodium chloride/electrolyte} | ignore just liquid/liquid sodium | **(1)** |

| Question Number | Answer | Acceptable answers | Mark |
|---|---|---|---|
| **2(b)(i)** | An explanation linking<br><br>Marking point 1<br>• {hydroxide/$OH^-$} ions (from water) (1)<br><br>Marking point 2<br>• (ions) lose electrons /are oxidised (1) | half equation, even unbalanced, showing hydroxide ions losing electrons (2)<br><br>do not allow marking point 1 if only {oxygen/sulfate} ions mentioned | **(2)** |

| Question Number | Answer | Acceptable answers | Mark |
|---|---|---|---|
| **2(b)(ii)** | 1.27 / 63.5 (1) (= 0.02) | 0.02 with no working (1)<br><br>correct working with incorrect answer (1) | **(1)** |

| Question number | Answer | Mark |
|---|---|---|
| 3(a)(i) | C | (1) |

| Question number | Answer | Mark |
|---|---|---|
| 3(a)(ii) | C | (1) |

| Question number | Answer | Mark |
|---|---|---|
| 3(b) | reactants are being used up (1) | (1) |

| Question number | Answer | Mark |
|---|---|---|
| 3(c) | An explanation that combines identification via a judgement (1 mark) to reach a conclusion via justification/reasoning (1 mark):<br>• aluminium and copper have different size atoms (1)<br>• and so this prevents the layers of metal atoms from sliding over one another (1) | (2) |

| Question number | Answer | Additional guidance | Mark |
|---|---|---|---|
| 3(d) | proportion gold = 9 ÷ 24 (= 0.375) (1)<br><br>mass = 0.375 × 12 = 4.5 (g) (1) | Award full marks for correct numerical answer without working. | (2) |

| Question number | Answer | Mark |
|---|---|---|
| **4(a)** | An explanation that combines identification – application of knowledge (1 mark) and reasoning/justification – application of understanding (1 mark):<br>• **J** and **K** are electrolytes (1)<br>• because their solutions conduct electricity and are decomposed (1) | **(2)** |

| Question number | Answer | Mark |
|---|---|---|
| **4(b)** | D | **(1)** |

| Question number | Answer | Mark |
|---|---|---|
| **4(c)** | An explanation that combines identification – understanding (1 mark) and reasoning/justification – understanding (3 marks):<br>• hydrogen ($H^+$) and sodium ($Na^+$) ions attracted to cathode, hydroxide ($OH^-$) ions and sulfate ($SO_4^{2-}$) ions attracted to anode (1)<br>• because the ions are attracted to the oppositely charged electrode (1)<br>• 2 hydrogen ions/2 $H^+$ accept 2 e to form hydrogen molecule/$H_2$ (1)<br>• 4 hydroxide ions/4 $OH^-$ lose 4 e to form oxygen molecule/$O_2$ (1) | **(4)** |

| Question number | Answer | Mark |
|---|---|---|
| **4(d)** | $Cu^{2+} + 2e^- \rightarrow Cu$<br>• all species (1)<br>• balancing (1) | **(2)** |

| Question Number | Answer | Acceptable answers | Mark |
|---|---|---|---|
| **5(a)(i)** | $2H_2O \rightarrow 2H_2 + O_2$<br>• reactant formula (1)<br>• product formulae (1)<br>• balancing correct formulae (1) | **Allow** 1 mark for $2H^2O \rightarrow 2H^2 + O^2$<br>**Ignore** state symbols<br>**Ignore** word equations | **(3)** |

| Question Number | Answer | Acceptable answers | Mark |
|---|---|---|---|
| **5(a)(ii)** | A description including the following:<br>• lighted splint / ignite gas / gas burns( 1)<br>• with (squeaky) pop (if air present) (1) | | **(2)** |

| Question Number | Answer | Acceptable answers | Mark |
|---|---|---|---|
| **5(a)(iii)** | A description including the following<br>• glowing splint (1)<br>• relights (1) | smouldering splint<br>**Ignore** blown out splint<br>lighted splint burns brighter = 2 | **(2)** |

| Question Number | Answer | Acceptable answers | Mark |
|---|---|---|---|
| **5(b)(i)** | B | | **(1)** |

| Question Number | Answer | Acceptable answers | Mark |
|---|---|---|---|
| **5(b)(ii)** | use a fume cupboard/open all the windows /(good) ventilation/wear a **gas** mask | **Ignore** do not breathe in | **(1)** |

| Question Number | Answer | Acceptable answers | Mark |
|---|---|---|---|
| **5(c)** | hydrochloric (acid) | **Ignore** HCl | **(1)** |