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

Question Number	Answer	Acceptable answers	Mark
1(a)(ii)	• (damp blue) litmus (paper) (1) • (turns red then) {bleaches / goes white} (1)	allow bleaches indicator for 1 mark ignore indicator goes lighter ignore smells of chlorine/swimming pools ignore any incorrect middle colour mentioned use of suitable named indicator with correct result e. (damp) universal indicator paper (1) (turns red then) bleaches (1) starch-iodide paper(1) 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)	$HCl + AgNO_3 \rightarrow AgCl + HNO_3$ • reactant formulae (1) • product formulae (1)	$Ag^+ + Cl^- \rightarrow AgCl$ max 1 if any incorrect attempt to balance 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 • electron(s) (1) • (have been) lost/removed (1) conditional on electrons	ignore reference to number of electrons do not allow negative charge chlorine gains electrons (0) allow chlorine loses electrons (1)	**(2)**

Question Number	Answer	Acceptable answers	Mark
2(a)(iii)	Any one from • it contains (excess) {hydroxide/OH^-} ions (1) • {sodium/Na^+} ions and {hydroxide/ OH^-} ions remain (1) • it is sodium hydroxide/NaOH (1) • {hydrogen/H^+} ions have been removed (at the cathode) (1)	ignore solution has pH greater than 7 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 Marking point 1 • {hydroxide/OH^-} ions (from water) (1) Marking point 2 • (ions) lose electrons /are oxidised (1)	half equation, even unbalanced, showing hydroxide ions losing electrons (2) 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) 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): • aluminium and copper have different size atoms (1) • 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) 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): • **J** and **K** are electrolytes (1) • 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): • hydrogen (H^+) and sodium (Na^+) ions attracted to cathode, hydroxide (OH^-) ions and sulfate (SO_4^{2-}) ions attracted to anode (1) • because the ions are attracted to the oppositely charged electrode (1) • 2 hydrogen ions/2 H^+ accept 2 e to form hydrogen molecule/H_2 (1) • 4 hydroxide ions/4 OH^- lose 4 e to form oxygen molecule/O_2 (1)	**(4)**

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

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

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

Question Number	Answer	Acceptable answers	Mark
5(a)(iii)	A description including the following • glowing splint (1) • relights (1)	smouldering splint **Ignore** blown out splint 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)**