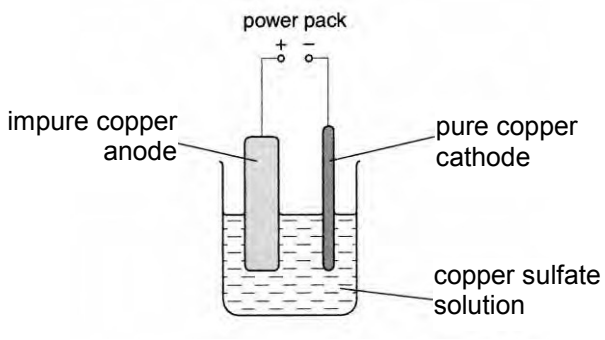
Question	Answer	Marks	Guidance
1 a	hydrogen (1)	1	**allow** correct answer ticked, circled or underlined in list if answer line is blank
b	chlorine is reactive (and may react with the electrode)/ so that the products don't react with the electrode (1)	1	**allow** electrode product reacts with electrode / hydrogen reacts with electrode (1) **ignore** so electrodes do not react with sodium chloride (solution) / so electrodes do not react with solution or electrolyte
c i	$\mathbf{2}Cl^- - \mathbf{2}e^- \rightarrow Cl_2$ (1)	1	**allow** any correct multiple, including fractions
c ii	oxidation because electrons are lost (1)	1	**allow** oxidation number of Cl increases / oxidation number of Cl goes from -1 to 0 (1) **not** chlor**ine** loses electrons or chlor**ine** ions lose electrons
	Total	**4**	

Question	Answer	Marks	Guidance
2 a	**2**Br^- - **2**e^- $\rightarrow$ Br_2 (1)	1	**allow** any correct multiple, including fractions **not** any additional symbols, other than balancing
b	(oxidation because) electrons are lost (from Br^-) (1)	1	**allow** oxidation number of Br increases (1) **not** bromine (atoms) lose electrons **but allow** ions lose electrons (1)
	Total	**2**	

Question			Answer	Marks	Guidance
3	(a	(i)	$2Cl^- \rightarrow Cl_2 + 2e^-$ / $2Cl^- - 2e^- \rightarrow Cl_2$ formulae correct including electrons (1) balancing – dependent on correct formulae (1)	2	**allow** = instead of → **not** and or & instead of + **allow** any correct multiples including fractions **allow** e^- or e for electrons **allow** $2Cl^- - e^- \rightarrow Cl_2 + e^-$ for two marks **allow** one mark for correct balanced equation with minor errors of case, subscript and/or superscript eg 2CL- → Cl2 + 2e- **allow** one mark for $Cl^- - e^- \rightarrow Cl$ / $Cl^- \rightarrow Cl + e^-$ **allow** one mark for $2Cl^- \rightarrow Cl_2$
		(ii)	solid sodium chloride has ions in fixed positions / ions do not move in a solid (1) liquid sodium chloride has ions that move (1)	2	**allow** solid does not have free ions **ignore** electrons cannot move in a solid **allow** liquid sodium chloride has free ions **not** electrons can move in a liquid **allow** if no other marks scored award one mark for particles can move in a liquid but not in a solid / liquid has mobile charge carriers but solid does not
			Total	**6**	

Question			Answer	Marks	Guidance
	(b)		experiments **1** and **3** show that as time doubles mass (of copper made) doubles (1) experiments **3** and **4** show that as the current quadruples, the mass also quadruples (1) **OR** experiments **1** and **2** show that as current doubles mass (of copper made) doubles (1)	2	**allow** reference to the correct data in the table to identify which experiments they are using **allow** when the time doubles and the current stays the same the mass doubles **allow** when the current doubles and the time stays the same the mass doubles **allow** if no other marks awarded then as time and current increase the mass (of copper) increases for one mark
			Total	**6**	

Question			Answer	Marks	Guidance
4	(a)		$2Cl^- - 2e^- \rightarrow Cl_2$ / $2Cl^- \rightarrow Cl_2 + 2e^-$ formulae correct (1) balancing (1)	2	balancing mark is conditional on correct formulae **allow** = / ⇌ instead of → **allow** any correct multiples **allow** one mark for correct balanced equation with minor errors of case and subscript and superscript eg $2Cl^- - 2e^- \rightarrow Cl2$ **allow** $Cl^- - e^- \rightarrow Cl$ (1) **not** $2Cl^- + 2e^- \rightarrow Cl_2$
	(b)		sodium hydroxide (1)	1	**allow** caustic soda **allow** NaOH
			Total	**3**	

Question	Answer	Marks	Guidance
5 a	(copper because) good resistance to corrosion (1) **or** (aluminium because) good resistance to corrosion (1) low density (1) **or** (stainless steel because) good resistance to corrosion (1) strong (1) cheap(est) (1) **or** (titanium because) good resistance to corrosion (1) strong (1) low density (1)	3	**No mark for the metal – the mark is for the correct reason** **ignore** other properties **allow** copper does not rust (1) but **not** copper does not rust as easily **allow** aluminium does not rust (1) but **not** aluminium does not rust as easily **allow** lightweight (1), but **ignore** just light **allow only** £900 per tonne (1) **allow** titanium does not rust (1) but **not** titanium does not rust as easily **allow** lightweight (1), but **ignore** just light
b		2	**all three** labels correct scores 2 marks **one or two** labels correct scores 1 mark
	Total	**5**	

Question	Answer	Marks	Guidance
6 a	slippery / layers can slide over one another (1) (black / grey so) can be seen on the paper (1)	2	**allow** weak forces (of attraction) or weak bonds between layers (1) **allow** leaves mark on the paper / comes off onto the paper (1)
b i	has free electrons / mobile electrons / electrons that can move / delocalised electrons (1)	1	**not** has free ions **ignore** has spare electrons
ii	idea of a giant structure / has **many** covalent bonds (1) idea that strong bonds need to be broken / bonds need lots of energy to break (1)	2	**not** ionic bonds / (strong) intermolecular forces / bonds between carbon molecules – 0 marks for the question **allow** bonds are difficult to break (1) **allow many** strong covalent bonds are broken for 2 marks
	Total	**5**	