

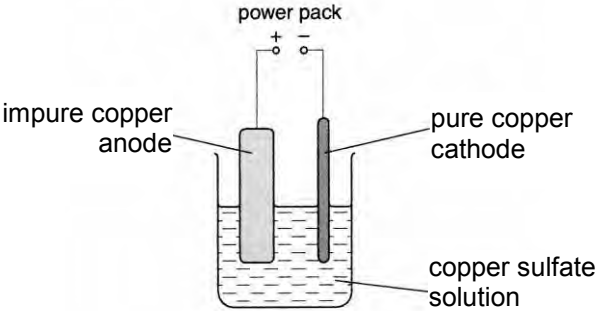
Question	Answer	Marks	Guidance
1 a	hydrogen (1)	1	allow correct answer ticked, circled or underlined in list if answer line is blank
b	chlorine is reactive (and may react with the electrode)/ so that the products don't react with the electrode (1)	1	allow electrode product reacts with electrode / hydrogen 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	$2Cl^- - 2e^- \rightarrow Cl_2$ (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 chlorine loses electrons or chlorine ions lose electrons
Total		4	

Question	Answer	Marks	Guidance
2 a	$2\text{Br}^- - 2\text{e}^- \rightarrow \text{Br}_2$ (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	<p>allow = instead of \rightarrow 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</p> <p>allow one mark for correct balanced equation with minor errors of case, subscript and/or superscript eg $2CL^- \rightarrow Cl_2 + 2e^-$</p> <p>allow one mark for $Cl^- - e^- \rightarrow Cl$ / $Cl^- \rightarrow Cl + e^-$ allow one mark for $2Cl^- \rightarrow Cl_2$</p>
		(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	<p>allow solid does not have free ions ignore electrons cannot move in a solid</p> <p>allow liquid sodium chloride has free ions not electrons can move in a liquid</p> <p>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</p>
			Total	6	

Question		Answer	Marks	Guidance
	(b)	<p>experiments 1 and 3 show that as time doubles mass (of copper made) doubles (1)</p> <p>experiments 3 and 4 show that as the current quadruples, the mass also quadruples (1)</p> <p>OR</p> <p>experiments 1 and 2 show that as current doubles mass (of copper made) doubles (1)</p>	2	<p>allow reference to the correct data in the table to identify which experiments they are using</p> <p>allow when the time doubles and the current stays the same the mass doubles</p> <p>allow when the current doubles and the time stays the same the mass doubles</p> <p>allow if no other marks awarded then as time and current increase the mass (of copper) increases for one mark</p>
		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 = / \rightleftharpoons instead of \rightarrow allow any correct multiples allow one mark for correct balanced equation with minor errors of case and subscript and superscript eg $2Cl - 2e^- \rightarrow Cl_2$ 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	<p>(copper because) good resistance to corrosion (1)</p> <p>or (aluminium because) good resistance to corrosion (1)</p> <p>low density (1)</p> <p>or (stainless steel because) good resistance to corrosion (1) strong (1) cheap(est) (1)</p> <p>or (titanium because) good resistance to corrosion (1) strong (1) low density (1)</p>	3	<p>No mark for the metal – the mark is for the correct reason ignore other properties</p> <p>allow copper does not rust (1) but not copper does not rust as easily</p> <p>allow aluminium does not rust (1) but not aluminium does not rust as easily</p> <p>allow lightweight (1), but ignore just light</p> <p>allow only £900 per tonne (1)</p> <p>allow titanium does not rust (1) but not titanium does not rust as easily</p> <p>allow lightweight (1), but ignore just light</p>
b	 <p>power pack + -</p> <p>impure copper anode</p> <p>pure copper cathode</p> <p>copper sulfate solution</p>	2	<p>all three labels correct scores 2 marks</p> <p>one or two labels correct scores 1 mark</p>
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	