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Chemistry (0620 style): Electrolysis

Topic Practice Paper: MARK SCHEME Maximum mark: 36

How to use this mark scheme

- A semicolon (;) separates marking points. Each marking point is worth 1 mark.
- A slash (/) separates alternative answers that are all acceptable.
- **allow** = also accept this answer. **do not allow** = this answer gets no credit.
- **and** in bold = both parts are needed for the mark.
- Mark the work first, then go back to your notes for any topic where you lost marks.

Question	Answer	Marks	Guidance
1(a)	breakdown / decomposition of an ionic compound ; when molten or in aqueous solution, by passing an electric current ;	2	allow electrolyte for ionic compound
1(b)(i)	A	1	A is connected to the positive terminal
1(b)(ii)	ions must be free to move (when molten) ; in the solid the ions are in fixed positions / held in a lattice ;	2	do **not** allow electrons move
1(b)(iii)	anode: bromine ; cathode: lead ;	2	
1(b)(iv)	brown / red-brown gas or vapour	1	allow orange-brown
1(c)	conducts electricity ; inert / unreactive / does not react with the products ;	2	allow high melting point for mark 2
	Total	**10**	
2(a)	conc. aqueous sodium chloride: hydrogen ; chlorine ; dilute sulfuric acid: hydrogen ; oxygen ; aqueous copper(II) sulfate: copper ; oxygen ;	6	one mark per correct box
2(b)	sodium is more reactive than hydrogen ; so hydrogen ions are discharged / gain electrons instead of sodium ions ;	2	
2(c)	cathode: $2H^+ + 2e^- \rightarrow H_2$; anode: $2Cl^- \rightarrow Cl_2 + 2e^-$;	2	allow $2Cl^- - 2e^- \rightarrow Cl_2$
2(d)	test: damp (blue) litmus paper ; result: bleached / turns white ;	2	allow turns red then white
	Total	**12**	
3(a)	cathode	1	allow negative electrode
3(b)	copper(II) sulfate (solution)	1	allow any soluble copper(II) salt

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Question	Answer	Marks	Guidance
3(c)	any two from: to improve appearance ; to prevent corrosion / rusting ; to make it harder-wearing ;	2	
3(d)	at the key: $Cu^{2+} + 2e^{-} \rightarrow Cu$; at the copper electrode: $Cu \rightarrow Cu^{2+} + 2e^{-}$;	2	
3(e)	copper ions are removed at the cathode / key ; and replaced by copper ions formed at the anode, so the concentration of Cu^{2+} stays the same ;	2	
	Total	**8**	
4(a)	lowers the melting point / operating temperature ; saves energy / reduces cost ;	2	allow improves electrical conductivity for mark 1
4(b)	oxygen is produced at the anode ; it reacts with the carbon to form carbon dioxide / the anode burns away ;	2	
4(c)	$Al^{3+} + 3e^{-} \rightarrow Al$	1	
4(d)	aluminium ions gain electrons	1	
	Total	**6**	

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