REDOX REACTIONS & ELECTROLYSIS 1

MARK SCHEME

Q1.

Question	Answer	Extra information	Marks
(a)(i)	because they are positively charged	accept they are positive / H^+ accept oppositely charged or opposites attract ignore they are attracted	1
(ii)	gains one / an electron	accept $H^+ + e^- \rightarrow H$ or multiples allow gains electrons	1
(d)	Marks awarded for this answer will be determined by the Quality of Written Communication (QWC) as well as the standard of the scientific response.		6
0 marks	Level 1 (1-2 marks)	Level 2 (3-4 marks)	Level 3 (5-6 marks)
No relevant content.	There are basic descriptions of advantages or disadvantages of the electrolysis cells.	There are clear descriptions of environmental or economic advantages or disadvantages of the electrolysis cells. Comparisons may be implied.	There are detailed descriptions of environmental and economic advantages and disadvantages, comparing the electrolysis cells.
examples of chemistry points made in the response: Accept converse where appropriate. • mercury cell is more expensive to construct • mercury is recycled but membranes must be replaced • mercury is toxic but membrane / polymer is not • removing traces of mercury from waste is expensive • mercury cell uses more electricity • mercury cell produces chlorine that is purer • mercury cell produces higher concentration / better quality of sodium hydroxide (solution)			
Total			8

Q2.

Question	Answer	Extra information	Marks
(i)	$2I \rightarrow I_2 + 2e^-$		1
(ii)	hydrogen is formed because sodium is more reactive (than hydrogen)		1 1
Total marks			3

Q3.

Question	Answer	Extra information	Marks
(i)	because it lowers the melting point (of the aluminium oxide) so less energy is needed (to melt it)	allow lowers the temperature needed do not accept lowers boiling point accept so that the cell / equipment does not melt	1 1
(ii)	2 O^{2-} on left hand side $4e^-$ on right hand side	accept correct multiples or fractions accept $-4e^-$ on left hand side	1 1
(iii)	because the electrode reacts with oxygen **or** because the electrode burns to form carbon dioxide or electrode made from carbon / graphite		1 1
Total marks			6

Q4.

Question	Answer	Extra information	Marks
(a)(i)	current / charge couldn't flow because the ions / particles couldn't move or (salt) needs to be molten / (1)	allow could not conduct (electricity) do not accept electrons/ molecules / atoms	1 1

	dissolved (to conduct electricity) so that the ions / particles can move (1)	 do not accept electrons / molecules / atoms	
(ii)	he had status or he had evidence / proof	accept he had authority or experience accept the experiment could be repeated	1
(b)	hydrogen / H_2 the ions are positive potassium is more reactive (than hydrogen)	do not allow hydrogen ions accept because opposite (charges) attract accept potassium ions are less easily discharged (than hydrogen) or potassium ions are less easily reduced (than hydrogen)	1 1 1
(c)	$2Cl^- \rightarrow Cl_2 + 2e^-$	must be completely correct, including charge on electron accept correct multiples	1
Total marks			7

Q5.

Question	Answer	Extra information	Marks
(a)	electric current / electricity plus **one** from: • is passed through ionic compound / substance / electrolyte • passed through molten/aqueous compound / substance • causing decomposition	 must be linked to electricity allow liquid compound / substance do **not** allow solution / liquid alone accept split up / breakdown / breaking up owtte ignore separated accept elements are formed ignore new substances form	1 1
(b)	hydrogen	accept H_2 do not accept H / H_2	1
Total marks			3

Q6.

Question	Answer	Extra information	Marks
(a)	ions can move / are attracted to electrode **or** attracted to named electrode **or** ions are charged or ions form / carry the current or ions form the charge	accept ions are free allow 'they' for ions	1
(b)(i)	electron gain	ignore hydrogen reduces charge	1
(ii)	$2Cl^- - 2e^- \rightarrow Cl_2$ or $2Cl^- \rightarrow Cl_2 + 2e^-$	allow fractions or multiples allow e or e^- do **not** allow e^+	1
Total marks			3