

Question	Marking Guidance	Mark	Comments
5(a)	$\text{H}_2\text{O}_2$	1	Ignore state symbols
5(b)	$E^\ominus \text{Cl}_2/\text{Cl}^- > E^\ominus \text{O}_2/\text{H}_2\text{O}$  $\text{Cl}_2 + \text{H}_2\text{O} \rightarrow 2\text{Cl}^- + 1/2\text{O}_2 + 2\text{H}^+$	1	Allow potential for chlorine/ $\text{Cl}_2$ greater than for oxygen/ $\text{O}_2$ Allow $1.36 > 1.23$ / E cell = 0.13
		1	Allow multiples Allow + HCl
5(c)	Activation energy is high / light/UV provides the activation energy / light breaks chlorine molecule / Cl–Cl bond	1	If light used to break Cl–Cl bond award 1 mark and ignore product e.g. $\text{Cl}^-$
5(d)	<u>O (-1)</u> (in $\text{H}_2\text{O}_2$ ) Changes to <u>O(-2)</u> (in water)	1	Must give oxidation state of O in $\text{H}_2\text{O}_2$ = -1
		1	Must give oxidation state of O in water = -2 CE = 0/2 if refers to oxidation state of H changing
5(e)	$E^\ominus \text{H}_2\text{O}_2/\text{H}_2\text{O} > E^\ominus \text{O}_2/\text{H}_2\text{O}_2$  $2\text{H}_2\text{O}_2 \rightarrow \text{O}_2 + 2\text{H}_2\text{O}$	1	Allow stated in words Allow $1.77 > 0.68$ / E cell = 1.09
		1	Allow multiples $\text{H}^+$ and $\text{e}^-$ must be cancelled