ELECTROLYSIS

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When an ionic compound is melted or dissolved in water, the ions are free to move about within the liquid or solution. These liquids and solutions are able to conduct electricity and are called electrolytes. Passing an electric current through electrolytes causes the ions to move to the electrodes. Positively charged ions move to the negative electrode (the cathode), and negatively charged ions move to the positive electrode (the anode). Ions are discharged at the electrodes producing elements. This process is called electrolysis.	132-133	135-136	58-59	1
When a simple ionic compound (eg lead bromide) is electrolysed in the molten state using inert electrodes, the metal (lead) is produced at the cathode and the non-metal (bromine) is produced at the anode.	132-133	135-136	58-59	1
Metals can be extracted from molten compounds using electrolysis. Electrolysis is used if the metal is too reactive to be extracted by reduction with carbon or if the metal reacts with carbon. Large amounts of energy are used in the extraction process to melt the compounds and to produce the electrical current. Aluminium is manufactured by the electrolysis of a molten mixture of aluminium oxide and cryolite using carbon as the positive electrode (anode).	132-133	135-136	58-59	1
The ions discharged when an aqueous solution is electrolysed using inert electrodes depend on the relative reactivity of the elements involved. At the negative electrode (cathode), hydrogen is produced if the metal is more reactive than hydrogen. At the positive electrode (anode), oxygen is produced unless the solution contains halide ions when the halogen is produced. This happens because in the aqueous solution water molecules break down producing hydrogen ions and hydroxide ions that are discharged.	132-133	135-136	58-59	1
During electrolysis, at the cathode (negative electrode), positively charged ions gain electrons and so the reactions are reductions. **At the anode (positive electrode), negatively charged ions lose electrons and so the reactions are oxidations.**		134	57	1

Reactions at electrodes can be represented by half equations, for example: **$2H^+ + 2e^- \rightarrow H_2$** **and** **$4OH^- \rightarrow O_2 + 2H_2O + 4e^-$** **or** **$4OH^- - 4e^- \rightarrow O_2 + 2H_2O$**				