

C6 - Electrolysis

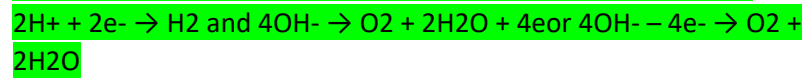
Lessons TBAT	Key Knowledge	Practical	Assessment
<p>TBAT: Explain how electrolysis can separate an ionic substance.</p> <p>TBAT: Explain what happens at the electrodes.</p> <p>TBAT: Describe how aluminium can be obtained from aluminium oxide.</p> <p>TBAT: Describe how to electrolyse brine</p>	<p>5.4.3.1 The process of electrolysis 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. (HT only) Throughout Section</p> <p>4.4.3 Higher Tier students should be able to write half equations for the reactions occurring at the electrodes during electrolysis, and may be required to complete and balance supplied half equations.</p> <p>5.4.3.2 Electrolysis of molten ionic compounds When a simple ionic compound (eg lead bromide) is electrolysed in the molten state using inert electrodes, the metal (lead) is</p>	<p>Required practical activity 9: investigate what happens when aqueous solutions are electrolysed using inert electrodes. This should be an investigation involving developing a hypothesis.</p>	<p>Required practical 6 mark question</p> <p>Maths focus Half Equations</p>

<p>in terms of ions moving.</p>	<p>produced at the cathode and the non-metal (bromine) is produced at the anode. Students should be able to predict the products of the electrolysis of binary ionic compounds in the molten state.</p> <p>5.4.3.3 Using electrolysis to extract metals 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). Students should be able to: • explain why a mixture is used as the electrolyte • explain why the positive electrode must be continually replaced.</p> <p>5.4.3.4 Electrolysis of aqueous solutions 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.</p> <p>Students should be able to predict the products of the electrolysis of aqueous solutions containing a single ionic compound.</p>	<p>Key stage 3</p> <ul style="list-style-type: none"> <li>• chemical reactions as the rearrangement of atoms</li> <li>• representing chemical reactions using formulae and using equations</li> </ul>
---------------------------------	---	---

## 5.4.3.5 Representation of reactions at electrodes as half equations

(HT only)

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. Reactions at electrodes can be represented by half equations, for example:



## C6 - Electrolysis