

Science Bank: Chemistry

Programme 2: Electrochemistry

Activity 1 worksheet: The language of electrochemistry

a) Here is a list of important terms we use in electrochemistry:

Anion	Cathode	Electrolyte
DC voltage	Electrolysis	Cell
Anode	Cation	Ion
Electrode		

The meanings of each of these terms is given in the table below

Term	Meaning
Electrode	The terminal at which electricity enters or leaves the electrolyte
	A charged particle
	A negatively charged particle
	The negative electrode
	A chemical change which is the result of electricity passing through an electrolyte
	A positively charged particle
	The positive electrode
	A substance which can conduct electricity in its molten or dissolved state
	The container in which an electrochemical reaction takes place
	A voltage which drives current around a circuit in one direction only

Copy and complete the table by writing the correct term from the list above next to its meaning.

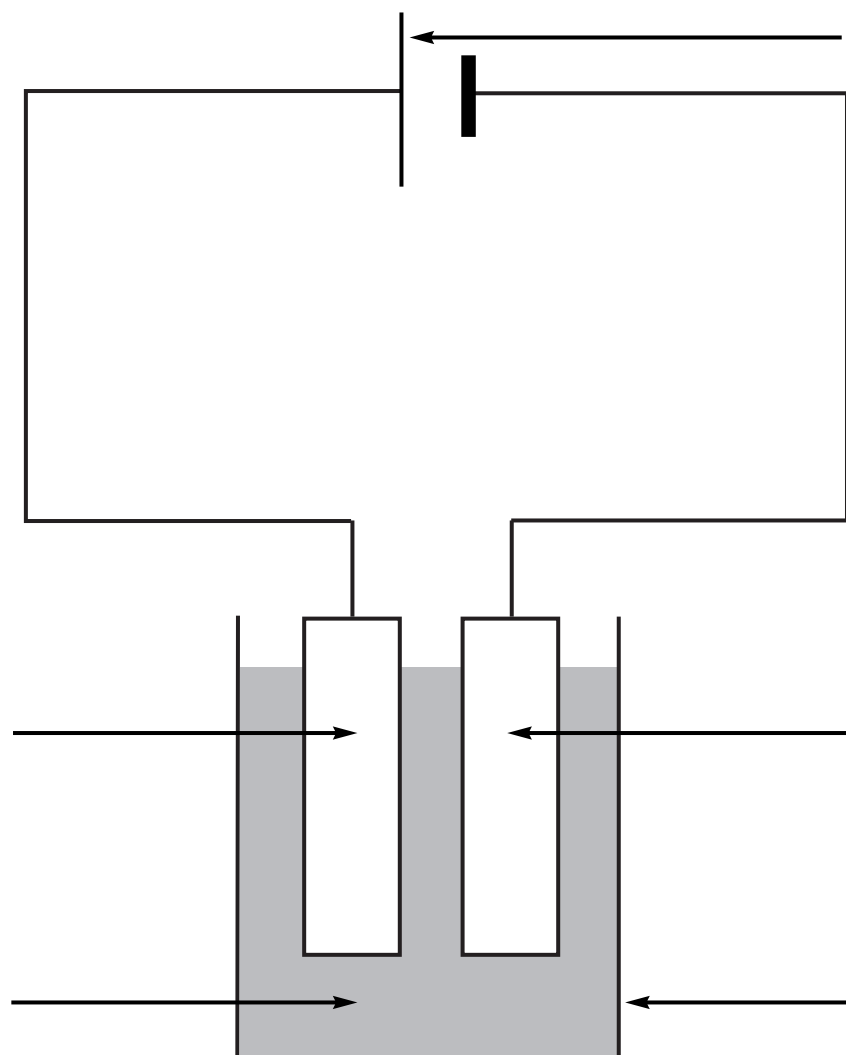
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b) The diagram below shows a simple electrolysis circuit. Complete it using labels from the following list.

cell cathode anode DC voltage electrolyte



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Activity 2 worksheet: Investigating the electrolysis of copper sulphate solution

In the Electrochemistry programme, you learned that there are mass changes at the electrodes when we use copper sulphate solution for electroplating. If the electrodes are made from copper, the mass of the negative electrode (the cathode) increases during the electrolysis while there is an equal mass loss at the anode.

Does the mass change at the cathode or anode depend on the current that flows in the electrolysis circuit? You could use the following apparatus to investigate this problem.

- DC voltage supply
- Variable resistor or rheostat
- Electrolysis cell containing copper sulphate solution
- Copper electrodes
- Multimeter

Plan an investigation to find out if the current that flows in the circuit affects the mass loss that occurs at the anode (hint: you will need to keep the current smaller than 1 amp.)

- a) Use your knowledge of the electrode reactions to predict what might happen in this investigation.
- b) Think carefully about the variables in this experiment. What are you going to change and by how much? What must you keep the same?
- c) Discuss with your teacher how you will approach this investigation.

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Activity 3 worksheet: The Aluminium Company of America

Aluminium is a modern metal that has many useful properties. It was expensive and rarely used before the twentieth century because until then no one had discovered an economic method of extracting the metal from its ore.

In the late nineteenth century a commercial method of making aluminium was developed by a young American chemist called Charles Martin Hall. Here is a fact file on Hall's discovery of a 'cheap' method of making aluminium.

- In 1885, Charles Martin Hall obtains degree in chemistry at age of 21. He sets up a laboratory in a garden shed at his home in Ohio and using home-made batteries looks for a way of using electrolysis to extract aluminium from its ore.
 - In 1886, Hall discovers that aluminium ore dissolves in molten cryolite, a mineral with the formula, Na_3AlF_6 . He electrolyses a solution of the ore in cryolite and gets aluminium metal at the cathode.
 - Hall finds financial backing to develop his process on an industrial scale. He founds the Aluminium Company of America (Alcoa).
 - The cost of aluminium begins to fall steeply. The properties of aluminium are exploited in the growing car and aircraft industries of the USA.
- a)** Imagine that you are the science and technology reporter of a national newspaper in the USA in the early years of the twentieth century.
- b)** Use this information about Hall's discovery to write a front-page article describing the events that led to the foundation of the Aluminium Company of America.
- c)** Use a DTP package or a word-processor to present your work.

If you have Internet access, you can download more material about Charles Hall and aluminium production at:

<http://www.cc.oberlin.edu/~EOG/OYTT-images/CMHall.html>