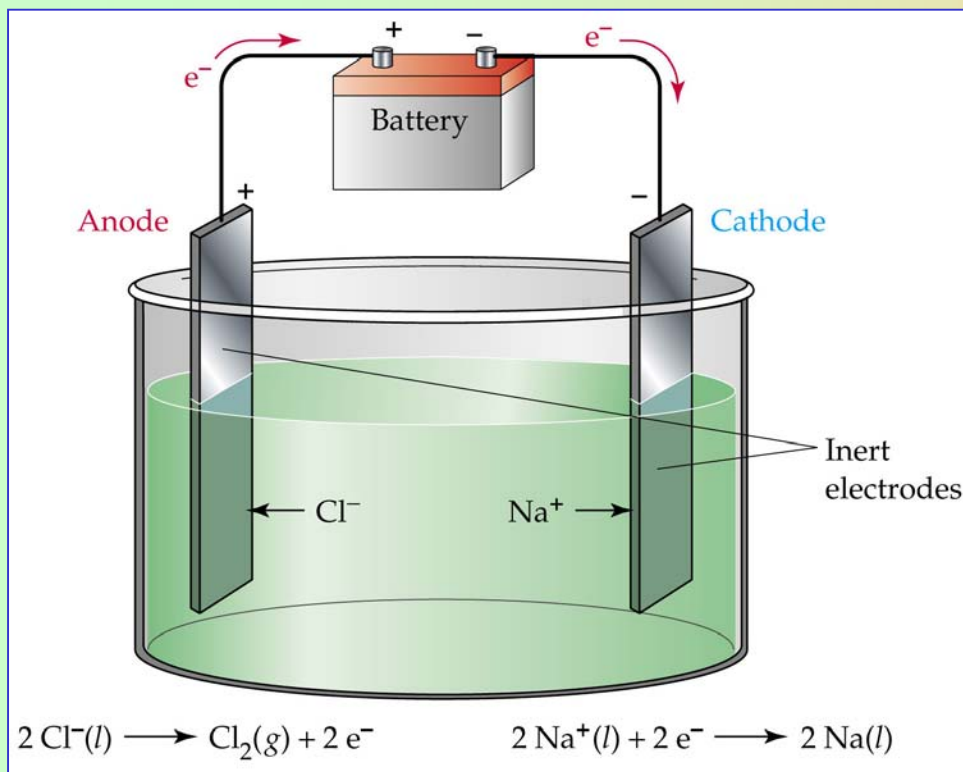
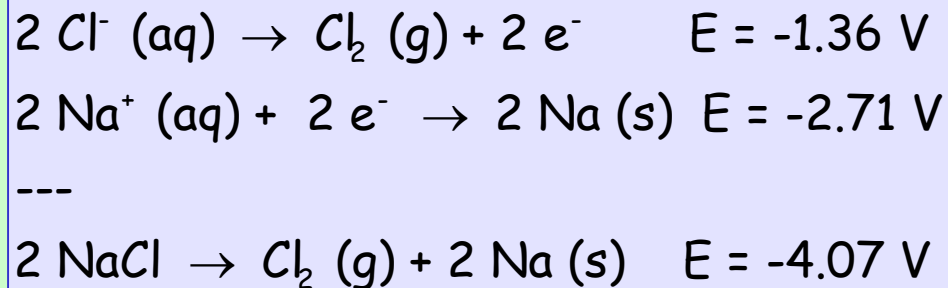


Electrolysis



http://wps.prenhall.com/wps/media/objects/602/616516/Media_Assets/Chapter18/Text_Images/FG18_15.JPG



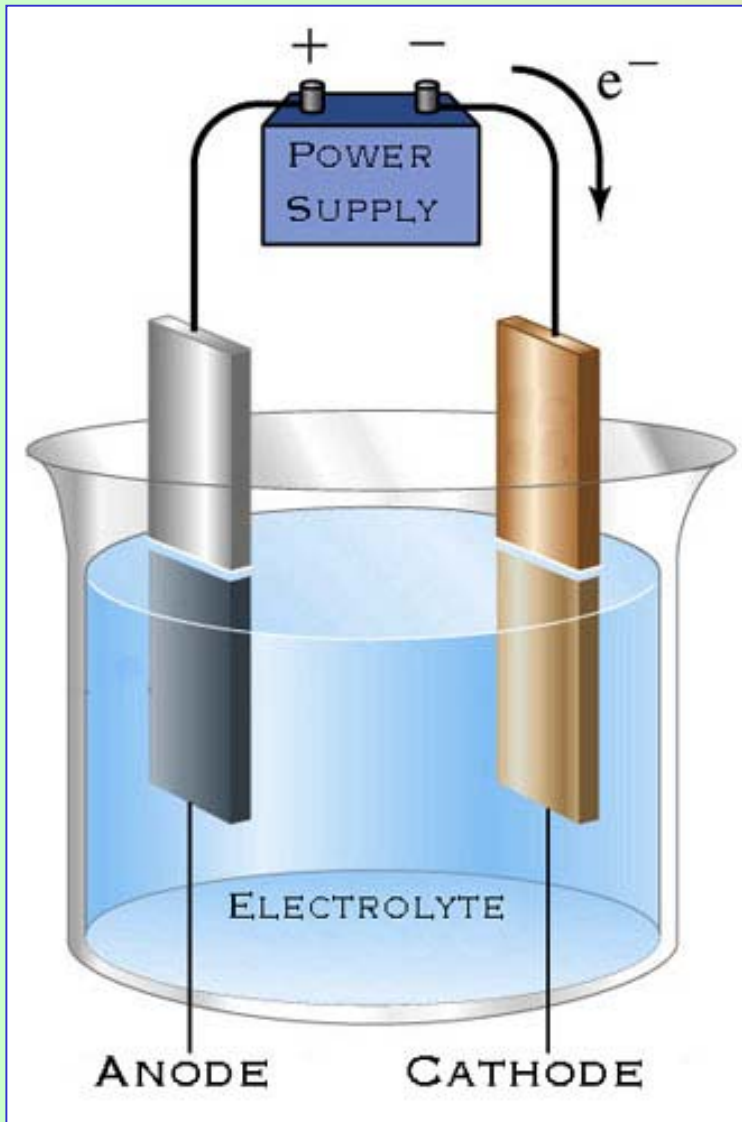
Electrolysis

Voltaic cells are based on spontaneous reactions.

But it is possible to force nonspontaneous reactions to occur, by using electricity.

Such processes, which are driven by an outside source of electricity are called **electrolysis reactions** and take place in **electrolytic cells**.

Electrolysis



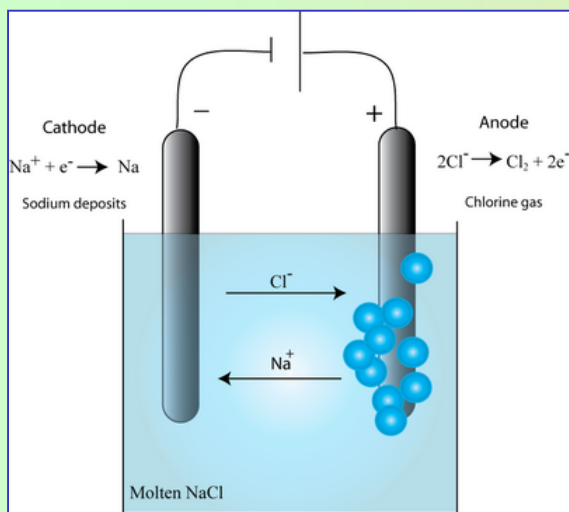
Electrolysis

An electrolytic cell consists of two electrodes in a molten salt or a solution. The cell is driven by a source of direct electrical current.

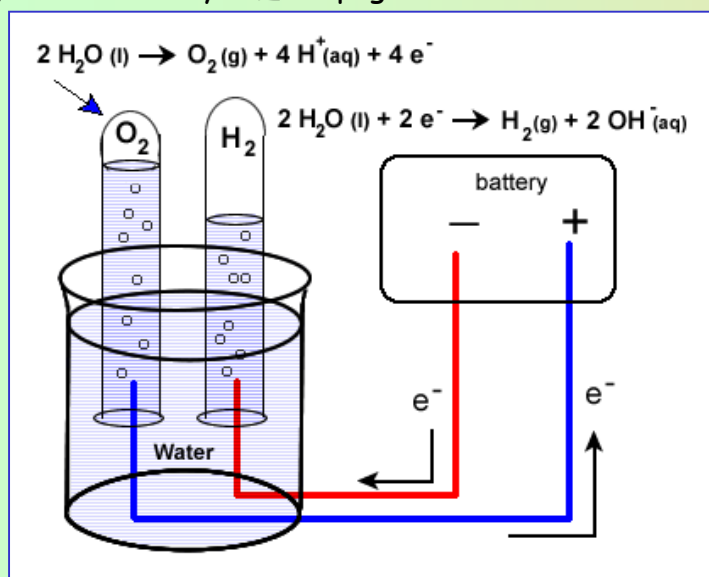
The **battery** acts as an **electron pump**, pushing electrons into one electrode and pulling them from the other.

The electrode at which **reduction** occurs is the **cathode** and the one at which **oxidation** occurs is the **anode**.

Electrolysis



http://www.doitpoms.ac.uk/tlplib/electromigration/figures/electrolysis_sml.png

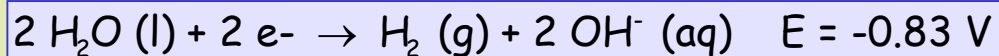
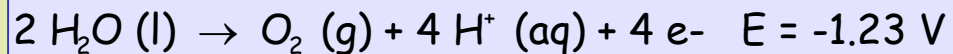


http://www.saskschools.ca/curr_content/chem30_05/gaphics/6_graphics/electrolysis_water.gif

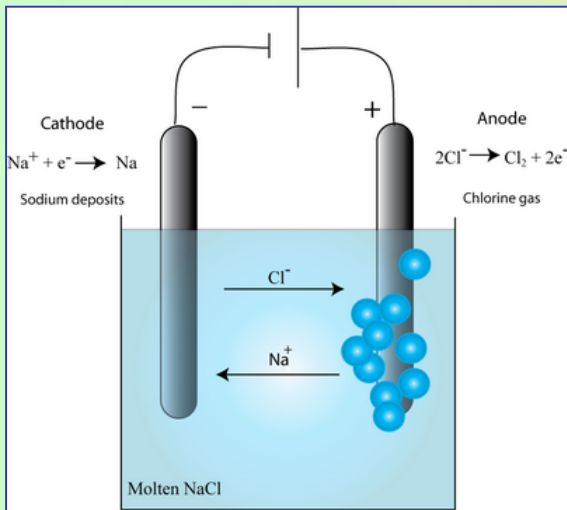
Electrolysis of an aqueous solution

The electrolysis of an aqueous solution is complicated by the presence of water.

We must consider whether the water is oxidized (to form O_2) or reduced (to form H_2) instead of the ions of the salt.



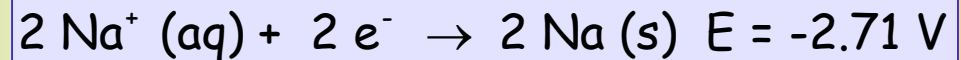
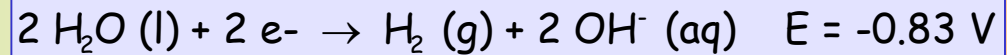
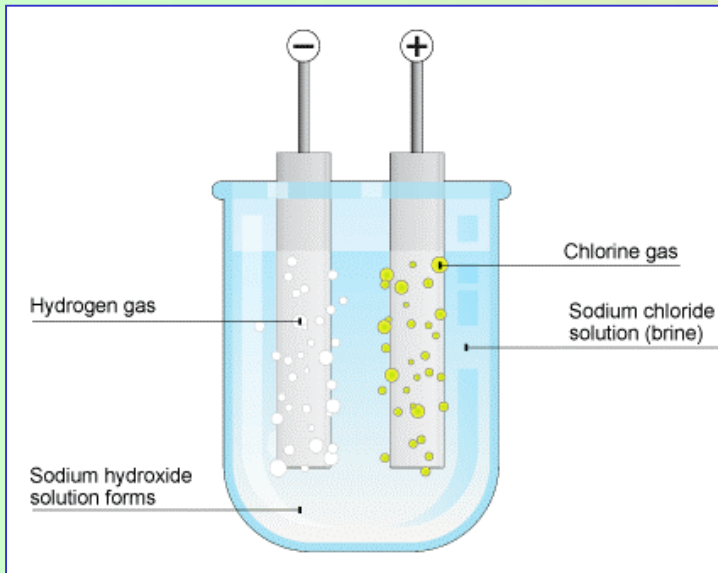
Electrolysis



Electrolysis of an aqueous solution

The electrolysis of NaCl (aq) leads to somewhat unexpected result. At the cathode H_2O is reduced to H_2 .

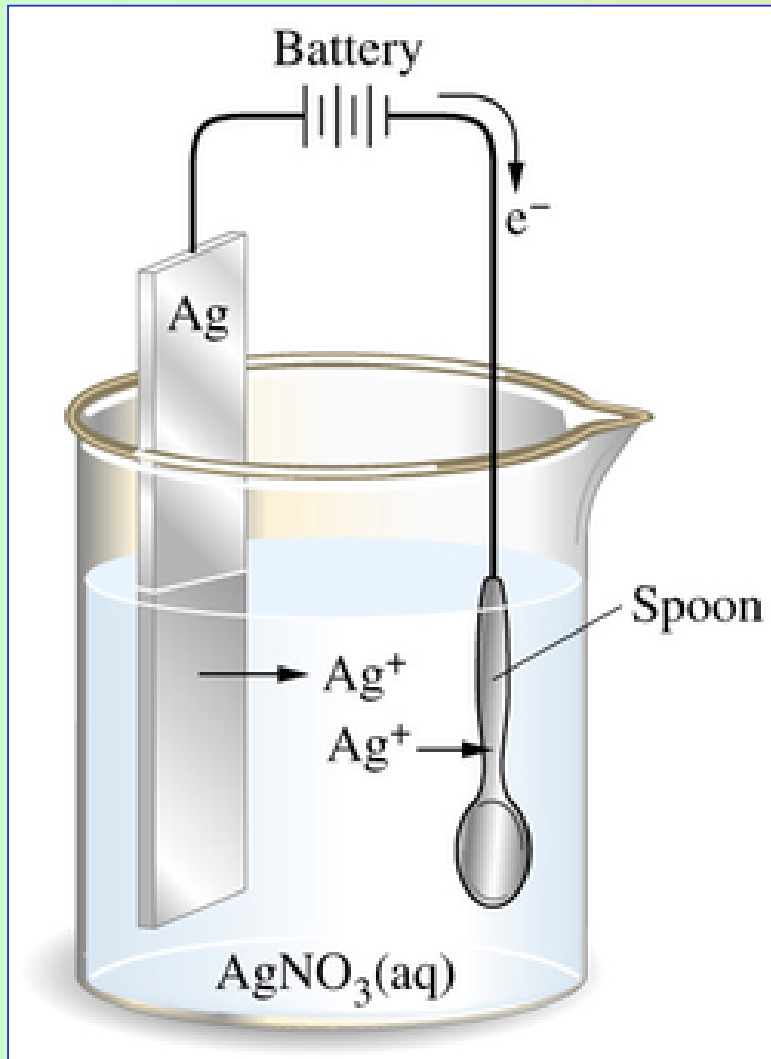
http://www.doitpoms.ac.uk/tlplib/electromigration/figures/electrolysis_sml.png



Water is easier to be reduced than sodium ions.

http://www.bbc.co.uk/schools/gcsebitesize/science/images/52_substances_from_salt.gif

Electrolysis

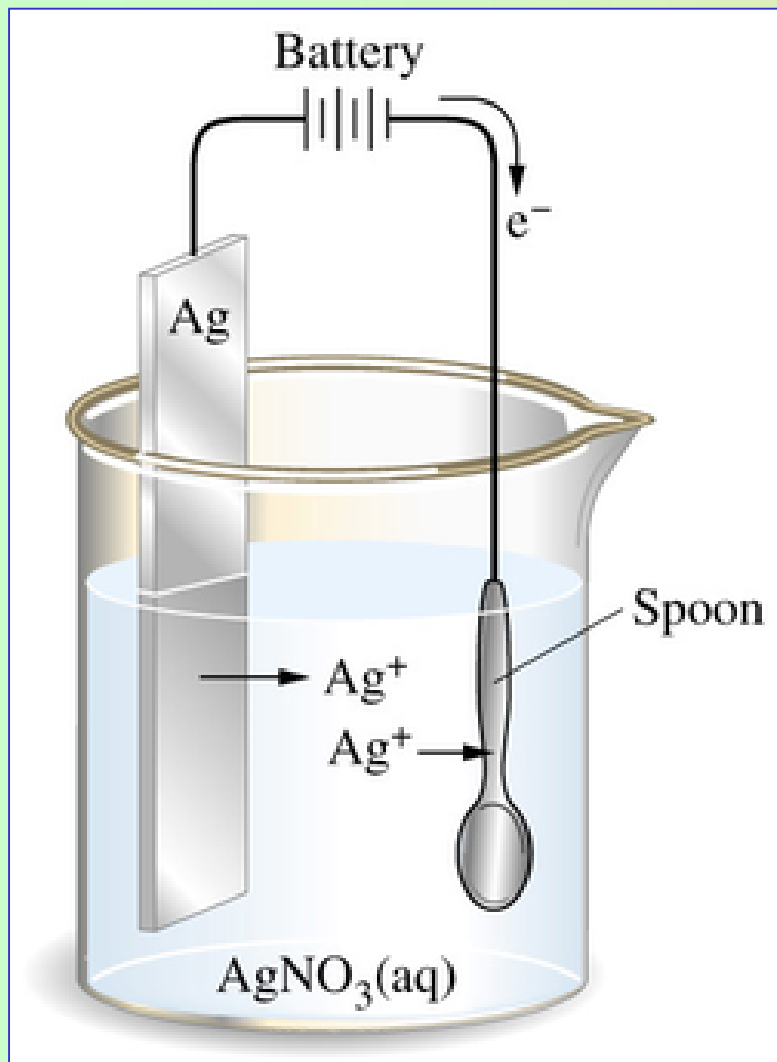


Electrolysis with active electrodes

Several practical applications of electrochemistry are based on active electrodes, electrodes that participate in electrolysis process.

For example, the process called **electroplating** involves using electrolysis to deposit a thin layer of one metal on another metal in order to improve beauty or resistance to corrosion.

Electrolysis



Quantitative aspects of electrolysis

The quantity of charge passing through an electrical circuit, such as that of an electrolytic cell, is generally measured in coulombs.

The charge on 1 mol of electrons is 96500 C (1 faraday).

$$1 F = 96500 \frac{\text{C}}{\text{mol}}$$

The number of electrons passing through a cell can be obtained by multiplying the amperage and the elapsed time in seconds:

$$q (\text{coulombs}) = I (\text{amperes}) * t (\text{seconds})$$