

# The Costly Battery – Teacher's Instructions



**For demonstration/class activity**

## ***Make Sure You Have...***

2 p pieces

2p sized pieces of filter paper

2p sized pieces of aluminium foil

Salt (sodium chloride, NaCl) solution

Ammeter (for measuring current)

Wires

## ***What To Do....***

1. Soak the pieces of filter paper in the salt solution
2. Make layer the objects in the order: 2p, soaked paper, foil, soaked paper, 2p, soaked paper, foil, etc. Make sure either end of the stack is one of the metals.
3. Attach each wire of the Ammeter to either end of the stack.

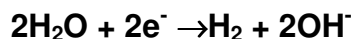
**You should be able to measure a very small current**

## ***What's Happening?***

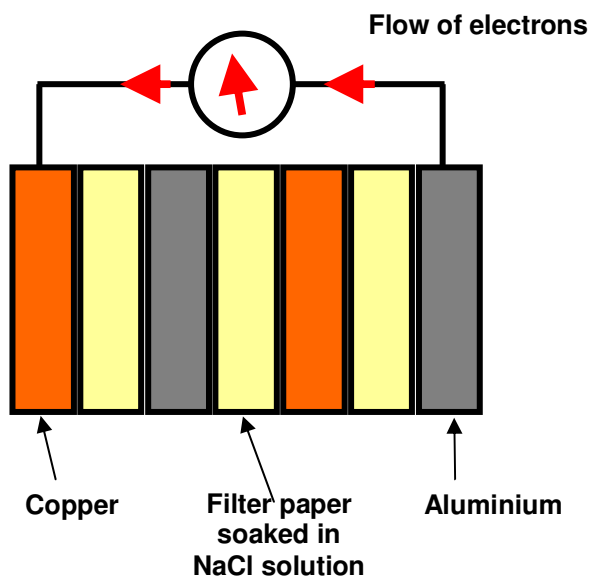
Aluminium has a greater desire to donate electrons than copper, which would rather receive electrons (in chemical terms, Aluminium is higher in the electrochemical series). For this reason, when you make up your coin/Aluminium sandwich, the Aluminium donates electrons to the Copper through an external wire and a flow of electrons (current) is set up. Since the Aluminium is providing the electrons, the Aluminium atoms are oxidised and the resulting  $\text{Al}^{3+}$  ions diffuse into the salt solution layer.



At the copper electrode, the electrons reduce water in the salt solution.



The overall result is that a flow of electrons is produced.



This is exactly the same way a battery works and usually, metals such as lead, nickel, cadmium and lithium are often used. Chemists are constantly working on ways to make batteries that are smaller, lighter and will last longer.



*A lithium (Li) mobile 'phone battery*