

## TAP 105- 2: Making electricity

### Lemon battery

Apparatus

Lemons

copper and zinc plates to act as electrodes

LED

connecting leads (crocodile clips can be used to connect to the electrodes)

high resistance voltmeter or multimeters.

### Instructions:



Wear safety spectacles

Ensure you wear safety spectacles throughout this experiment. Eye protection is necessary as the electrodes are pushed into a whole lemon – a jet of juice may enter an eye. If the electrodes are dipped into lemon juice in a test tube, the internal resistance is lower and the risk is so low that eye protection becomes unnecessary.

A simple cell can be formed using two different metals (copper and zinc) embedded in an acidic electrolyte (the lemon juice). Copper coins and galvanised nails can be used. This demonstrates the simplicity of the apparatus required.

However there are some pitfalls that need to be avoided. The internal resistance of the cell is high, so minimise it by having a large area of electrodes and a small separation. Since the emf is about a 1 V, you will need several cells in series to light the LED. Do not attempt to light even a small incandescent bulb, as its resistance will be far too low compared to the internal resistance of the lemon cell, and will short it out.

Electronic watches and other very low power consumption devices can be powered by kits based on simple cells.

### External references

This activity is taken from [http://www.hilaroad.com/camp/projects/lemon/lemon\\_battery.html](http://www.hilaroad.com/camp/projects/lemon/lemon_battery.html)