Fuel cells for future energy (preparation details for teachers and technicians)

SAFETY

KOH

- H290 May be corrosive to metals
- H302 Harmful if swallowed
- H314 Causes sever skin burns and eye damage
- P280 Wear protective gloves/clothing/eye protection

TO BUY

- **Potatoes**: small potatoes are fine, but any size will work
- **Pennies**: this acts as a copper electrode, either 1p or 2p coins work fine
- **Galvanised screws**: these provide the zinc needed for the redox; nearly all screws and nails sold are galvanised iron; they look blue/silver, as opposed to dark raw iron
- **Graphite electrodes**: graphite electrodes can be purchased, although pencils that are sharpened at both ends with a knife to expose the graphite work well.

LEDs

- **Voltmeter**: (mV-V range)

- **Insulated wires with crocodile clips**

TO PREPARE IN ADVANCE

- **0.38 M KOH(aq) solution**
  Each student needs ~50 mL solution. To make up 1 L of 0.4 M KOH(aq), dissolve 21 g of KOH (s) in 1 L of deionised water, being careful to add base to water.

- **Carbon electrodes**
  If pencils are being used as electrodes, sharpen both ends of each pencil with a knife to expose ~3 mm of ‘lead’ at each end.
STUDENTS WILL NEED

- 6 small potatoes
- 6 x 2 pence (or 1 pence) pieces
- 6 x galvanised screws/nails
- 7 insulated wires with crocodile clips
- a voltmeter
- an LED
- 2 graphite electrodes (2 pencils work well, sharpened with a knife of both ends to extend the graphite, or 6 x 0.7 mm leads for propelling pencils, taped together per electrode)
- selotape
- blu tack
- 1 x beaker
- 0.4 M KOH (aq)
- 1 x 9 V battery
- plastic knife
- universal indicator paper