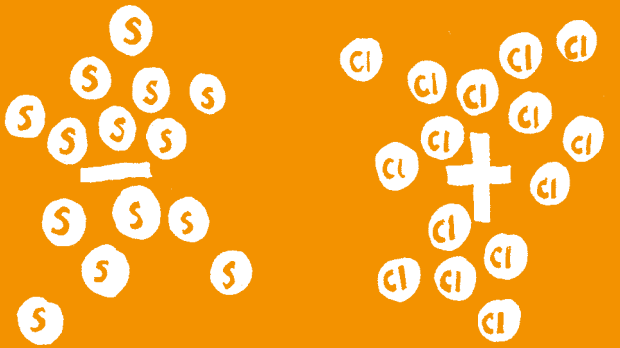
ENGINEERING
CHALLENGE

14

METAL ETCHING



THE
JAMES
DYSON
FOUNDATION

METAL ETCHING

ENGINEERING CHALLENGE 14

Designed by Ed,
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Malmesbury School

The brief

Etch a pattern into a sheet of metal using only things found in your home.

The method

1. Fill the bowl with 1.5in of water.
2. Mix salt with the water until no more can be dissolved.
3. Draw a pattern using the permanent marker on one sheet of metal.
4. Connect one crocodile clip to the metal on which you have drawn the pattern and the other to the spare piece of blank metal.
5. Place both pieces of metal in the salty water. Make sure they're as far apart as possible – don't let them touch.
6. Connect the patterned metal to the positive terminal of the battery and the plain metal to the negative terminal. The water will begin to fizz.
7. Wait about 10 minutes, then disconnect the battery and remove the patterned metal.

8. Clean it with water and nail polish remover to remove the permanent marker. You should see that the pattern you drew is now permanently etched into the surface of the metal.

Materials

- Table salt
- Paper clips
- Scissors (with adult supervision)
- Two pieces of sheet metal – mild steel
- Copper or brass
- 9v battery
- Two crocodile clip cables
- Nail polish remover
- A permanent marker

How does it work?

This process is called electrolysis. When you place electrodes into the salt water and apply electricity, chloride ions move towards the positive electrode and the sodium ions move towards the negative electrode. The reaction causes metal to be transferred from the positive side into the solution, etching away its surface.