Electroetching

This activity contributes to the following badges:

Cubs Activity Scientist: Reactions: "Find out what happens when you add salt to water", "Another activity agreed with your leader"

Scouts Activity Scientist: May form part of Option 2: "Plan and complete three science experiments or activities".

Introduction

The aim of this activity is to create a key ring using household materials and a metal disk.

Time 60–90 minutes

Preparation

Best done stood at tables, about $1\,\mathrm{m}^2$ per person, 1 adult to 4 young members, in a suitably ventilated hall.

Equipment

Per participant:

- Safety Equipment[1] ..... ☐
- Disk to etch[2,3,4] ..... ☐
- Mask (Vinyl Sticker)[5] ... ☐
- 1 small cup ..... ☐
- 1 teaspoon ..... ☐
- 1 paperclip ..... ☐
- 4 x AA batteries ..... ☐
- 4 x AA battery housing . ☐
- 1 crocodile clip set[6] ..... ☐
- 1 Petri dish[7] ..... ☐
- (Sandpaper ~P400)[8] ... ☐
- Key chain or string ..... ☐

1

Dissolve 1 tsp of salt in luke-warm water. There's a chance here to discuss what salt is and where it goes when dissolving.
Pour the solution into the Petri dish until about ¾ full.

2

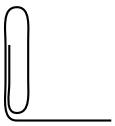
Prepare the surface of the disk. My steel disks needed to be sanded; my aluminium disks came with a polythene sheet protecting one side's surface.

3

Stick the stickers to the clean/shiny side. You could use nail polish or shellac to paint a mask; if you do this, you'll need solvents to clean afterwards.

4

Bend the paperclip so that it makes an 'L' shape. Attach the curved top to the black crocodile clip (the cathode; the -ve terminal of the battery).



5

Attach the red crocodile clip to the disk so that it makes a connection with reverse of the disk and only touches the insulated mask on the front.

6

⚠ Warn the young members about short circuits. That they should not touch the metal attached to the black clip to the metal of the red clip. That it will cause the wires to get hot enough to burn them.

7

Hand out and help young members to attach battery packs. Completely submerge the disk (mask up) in the solution.

[1] Aprons, Small X-Small gloves, safety glasses.
[2] For a mild steel disk: I found the disk shown in the image above on ebay. (I had to drill the hole myself.)
[3] For an aluminium disk Harrison & Harrison or these smaller stamping blanks via Amazon
[4] NB Do not use Stainless Steel, there is a small but non zero chance of producing toxic chemicals.
[5] Vinyl stickers e.g. letters, bespoke cut, or cut your own with e.g. a Cricut.
[6] I used Battery housing and clips with 9V connector.
[7] These from Amazon for example.
[8] Only required for iron/steel disk.