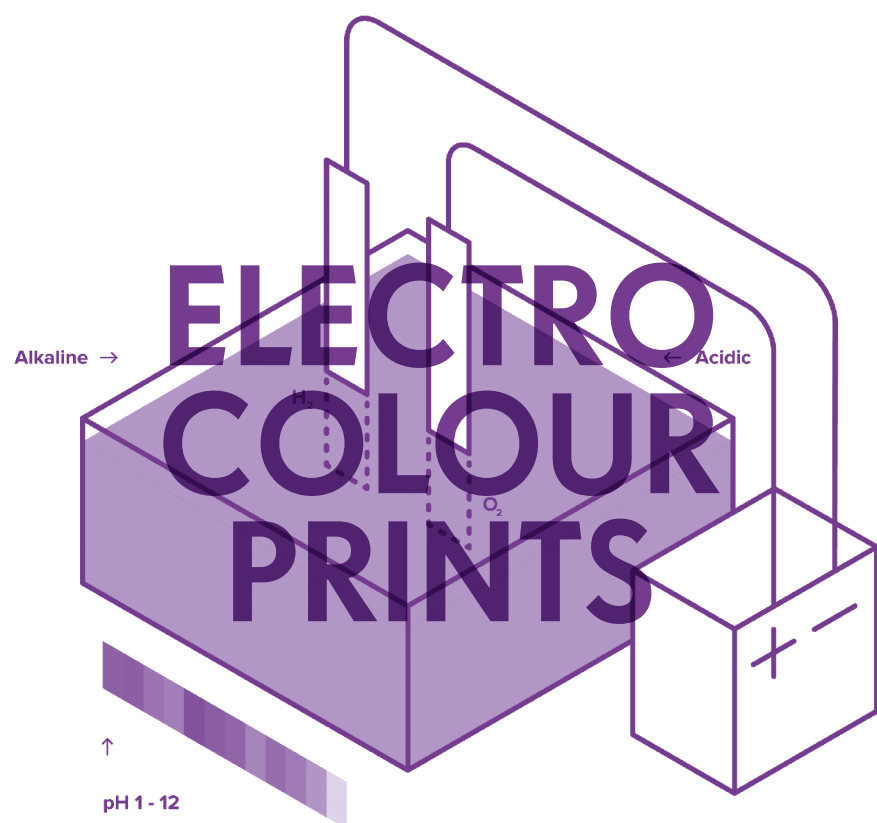


MAKERS MANUAL #19

Unit Lab



INTRODUCTION

Designed to be purely functional, electronic circuits stay hidden in a plastic shell. Fascinated by these encrypted complexities, Unit Lab worked on a technique for printing with electricity called Electro Colour. The technique uses custom circuit boards and an organic dye from red cabbage juice to print vivid patterns on textile. With this manual, you will design your own printing patterns, make your own circuits from aluminium foil and use electricity to print on fabrics.

STEP 1

Gather ingredients



STEP 2

Cut red cabbage in 2 centimetre thick slices.



STEP 3

Transfer the red cabbage into a saucepan and compact it as much as possible. Fill with water until the cabbage is just covered. Bring to a boil and simmer until the liquid looks dark purple, this should take about 20 minutes.



STEP 4

Remove the saucepan from the heat and carefully drain the liquid into a heat-proof container. At this point, add a heaped tablespoon of natural sea salt to the juice and stir well. This will make the dye conductive.



STEP 5

While your dye is cooling down, design your printing pattern. Electro Colour adopts a chemical reaction called electrolysis. As electricity moves through water, it breaks it down into hydrogen and oxygen. Red cabbage juice changes its colour around the concentrated areas of hydrogen and oxygen. Therefore, your pattern needs to have two distinct sides - a positive and a negative. They must not touch each other, but must be close enough to make the reaction happen. Plan your circuit on a piece of paper first before you commit to making it out of aluminium foil. Note that the 9V battery's terminals need to be able to touch both sides of the circuit. The ends of both positive and negative sides need to be close together.



STEP 6

Cut strips of aluminium foil using a pair of scissors. Join and fold the strips to make your circuit. You will end up with two pieces - the positive and the negative.



LIST OF THINGS

- Red cabbage
- Salt
- White natural fabric (cotton preferred)
- Aluminium foil
- 9V battery
- Saucepan
- Kitchen knife
- Scissors
- Hair dryer (optional)

BIO OF THE DESIGNERS

London design studio Unit Lab was founded by designer-maker Cindy Strobach and designer-engineer Mike Vanis with the aim of bringing science out of the lab and into everyday life. Having met at the Royal College of Art, the duo launched their studio in November 2015 with the Gravity Ruler – a desktop tool for measuring both length and weight – and have gone on to work on a number of projects that translate scientific theory into physical objects. Alongside its core projects, Unit Lab creates workshops and installations for schools, museums and cultural institutions.

FURTHER READING

- Red cabbage - A pH indicator
<https://www.youtube.com/watch?v=OMXMIWybv8A>
- How can water turn into fuel
<https://www.youtube.com/watch?v=cB-ny-7DaZm4>
- Indigo Artisan Ken Yuk
<https://www.youtube.com/watch?v=5S2n-77vRls>

Makers Manual is a collaborative project between exciting makers and STORE STORE. Participation is free and no design background is necessary. You can share your creations using #makersmanual. We will pick our favourite submissions and publish the results in a limited printed edition of all of the manuals. Everyone who makes it into the book will receive a free copy.

This project is supported by Coal Drops Yard.

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STEP 7

Lay out the positive and negative pieces of your circuit onto a surface. Red cabbage juice might stain sensitive surfaces, so a ceramic plate is ideal. Position both sides of the circuit close to each other and ensure that they are not touching.



STEP 8

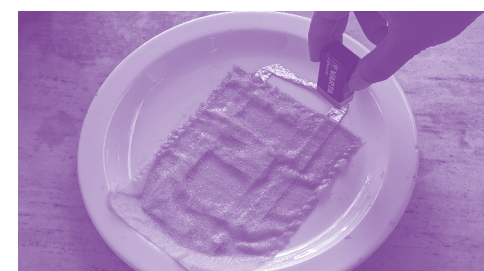
Soak the piece of fabric in the prepared dye. It should be thoroughly drenched.



STEP 9

Place the soaked fabric onto the circuit, ensuring that it is firmly in contact with the aluminium foil and that the positive and negative sides remain isolated. If the fabric isn't quite soaked enough, add a teaspoon of dye on top of the fabric to weigh it down and soak it further. When you're ready, touch

and hold the battery for about a minute onto the ends of the positive and negative pieces. As the water breaks down into hydrogen and oxygen, you'll notice that the dye is changing its colour from purple to yellow and blue. Remove the battery when you're happy with the result.



STEP 10

Carefully lift the fabric from the circuit. Hang it on a drying rack or dry it with a hair dryer. Make sure that it doesn't fold over itself to preserve the print's definition. We recommend drying the print with a hair dryer as the pattern will be more defined and the colours won't bleed into each other.





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