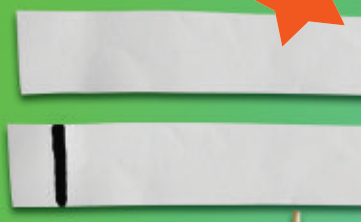
Nanotechnology and colour

Some of the earliest uses of nanotechnology occurred in the Middle-Ages in the ruby red colour that was used in stained-glass windows. This colour appeared red due to a cluster of gold particles that formed nanoparticles rather than the usual solid form. The small particles therefore let through the long-waves of red light, but blocked out the shorter waves of blue and yellow light. Today scientists believe that beautiful, hard-to-forge banknotes could be created, using nanotechnology that studies how light bounces off a butterfly's microscopic wings. Recreating the colours of beetles, butterflies and moths is no longer a technical challenge on such a small scale, thanks to nanotechnology.

EASY SCIENCE

Step 1 – Cut a strip from the paper towel that is 3cm wide and a little bit longer than your glass.



Step 2 – Draw a line with the marker one centimetre from the bottom of the paper towel.

Step 3 – Put some prestik onto the rim of the glass to help you control the pencil later.

Step 4 – Attach the paper towel strip to the pencil with some sticky tape.

Step 5 – Pour about half a centimetre of water into the drinking glass.

Step 6 – Lay the pencil across the top of the glass so that the bottom of the paper towel is only just in the water. Make sure that the marker's line is above the water.

Step 7 – Wait and watch! This experiment takes about 10 minutes and the process is just as interesting as the end result!

Marker ink chromatography experiment

Ink and paint get their colours by absorbing some of the colours in white light and reflecting others. Green ink looks green because it reflects the green part of the spectrum and absorbs all the other colours.
When we mix too many colours, each ink that we add absorbs more light. That leaves less light to reflect to your eye and we end up with black.
To prove this, you can do the following experiment at home:

Did you know?

The word chromatography means 'colour writing,' it can be used by biochemists to find the ingredients that make up a specific flavour and to find traces of drugs in urine.

Stuff you need:

- Set of water based markers
- Paper towel
- Scissors
- Drinking glass
- Pencil
- Sticky tape

Tip: Make sure your marker is water based for the experiment to work. The best option in this case is a koki pen.

What is happening?

Most marker inks are a mixture of different pigments. Each pigment is a different chemical. This affects the speed with which they move up the paper strip, and so the different colours are separated. Darker colours, like black and brown, contain more colour pigments, which is why they give such good results in this experiment.

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NRF National Research Foundation
SAASTA South African Agency for Science and Technology Advancement

NANOTECHNOLOGY PUBLIC ENGAGEMENT