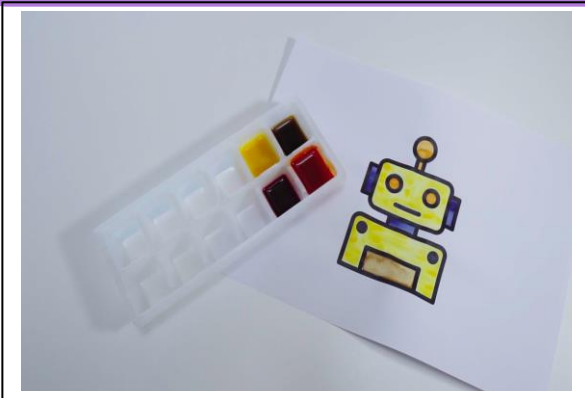


Colouring with natural dyes



Key words

- Plant
- Colorant
- Diffusion
- Chromoplast
- Household chemicals

The science behind

Introduction

In the video we have discovered eco-paints with natural dyes and will be using them for colouring and obtaining watercolour paints.

There are two types of dyes : natural and synthetic. Natural dyes come from animal or plant sources, while synthetic dyes are man-made. Before 1856, if you were trying to dye clothing, you would have had to use natural dyes. Some of the most common natural dyes include tyrian purple, cochineal red, madder red and indigo blue.

Tyrian purple was one of the most important natural dyes to have ever been found. As legend has it, a sheep dog belonging to Hercules was walking along the beach in Tyre. He bit into a small mollusk which turned his mouth the color of coagulated blood. This became known as royal or tyrian purple. It brought great prosperity to Tyre, Lebanon around 1500 BC and for centuries it was the most expensive animal dye money could buy. It was the color of high achievement and ostentatious



wealth ; it symbolized sovereignty and the highest offices in the legal system. Purple was the color of Cleopatra's barge and Julius Caesar decreed that the color could only be worn by the emperor and his household.

Cochineal is another example of an animal derived natural dye. Cochineal is a crimson dye made from cactus insects. It was introduced to Europe from Mexico by the Spanish. It was used as a cloth dye, artists' pigment, and much later as a food dye. This also required a huge seasonal harvest seeing as 17,000 dried insects produced a single ounce of dye.

On the other hand, plant dyes are generally cheaper and in greater supply. The most common being madder red and indigo blue. Madder came from the roots of 35 species of plants found in Europe and Asia. It has even been found in the cloth of mummies and was the first dye to be used as camouflage.

Indigo was mainly used as a dye and pigment. It was derived from a shrub-like plant that was soaked in water and then beaten with bamboo to quicken oxidation. During this process, the liquid changes from green to dark blue. It is then heated, filtered, and formed into a paste. Although this form of indigo is still in use, there is a synthetic version that is used today primarily to dye blue jeans.

Most plants are green due to chlorophyll pigment found within the many chloroplasts inside each green cell of the leaf. Most red and blue flowers have a form of the pigment anthocyanin with subtle differences caused by the acidity (pH). The color of many yellow and orange flowers is derived from carotenoid pigments. The brightness of a color is enhanced by an absence of chlorophyll.

Curcumin forms the yellow color of turmeric and is quite a stable molecule in its dry form.

Coffee beans turn from green to tan and then brown during roasting. The longer they are roasted, the darker brown beans will be.



The red colouration of red peppers is due to the production of the carotenoids capsanthin and capsorubin, both of which are found near-exclusively in red peppers.

Hibiscus species, used for tea, has flowers in red colour, the main



pigment are anthocyanins.

Every day life

In plants, colour is used for optimisation of light collection for photosynthesis, for photoprotection, or for communication to animals, either to attract or repel them. It can vary between different species and different parts of the plant.

The colours of the flower may depend on many factors. In hibiscus flowers we can see a variety of colours : the main three groups of pigments create their color displays. Flavonols are responsible for pale yellow or white colors. Carotenoids create yellows, orange, and red colours. Anthocyanins produce blue, purple, red, and pink colors, depending on the individual pigment molecule and the pH it is exposed to. Therefore, the natural colours can be also natural indicators. For instance, when the turmeric powder is mixed in a basic solution, it turns red in colour.

Colours are natural, for this reason with time the colours will change as a result of oxidation.