UNDERSTANDING YOUR FOOD
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TEACHER NOTES

C3. Using chromatography to analyse the colours in jelly babies

Pupils use chromatography to investigate the composition of the colours extracted from jelly babies in activity C2.

SAFETY NOTE AND TECHNICIANS NOTES:
TO PREPARE DILUTE AMMONIA SOLUTION; DILUTE ONE PART CONCENTRATED AMMONIUM HYDROXIDE R.D. 0.880 WITH 99 PARTS WATER.
THE CONCENTRATED AMMONIUM HYDROXIDE IS CORROSIVE WITH A HARMFUL VAPOUR; YOU MUST USE SAFETY GOGGLES; MIXING MUST BE DONE IN A FUME CUPBOARD.
ABOUT 20 CM^3 OF DILUTE AMMONIA SOLUTION IS NEEDED FOR EACH COLOUR REMOVAL.
USE THE DILUTE AMMONIA SOLUTION IN A WELL VENTILATED ROOM.

Safety notes and hints for pupils

Care must be taken when heating the coloured solution to evaporate the liquid. It is easy to heat the solution to dryness. Pupils must be aware that even when they stop heating the solution, evaporation continues to occur.

Heating ammonia solution may produce potentially dangerous fumes.

It is advisable to use the finest tubing as possible to spot the liquids onto the chromatography paper.

There are a number of waiting times in this experiment and it is advisable to have activities such as preparing the chromatography paper or others to occupy the pupils.

The results will obviously depend on the sweets used. Tesco's own brand give good results.

KS3 and 4
science *(possibly technology, but access to laboratory facilities is advised)*

Timing - 60 - 70 minutes

Two pupil activity sheets C3 accompany this activity.

Requirements

For removing the dye from the wool:

- *lengths of dyed wool made in C2*
- *dilute ammonia solution (see box)*
- *50 cm^3 or 100 cm^3 beakers*
- *stirring rods or tongs*
- *hot plates or water baths*
- *stopclocks*
- *safety goggles*

For chromatography:

- *chromatography or filter paper (if single chromatograms are to be run this needs to be about 12 cm x 3 cm; if you would like to test all the colours at the same time, then appropriately larger pieces are needed)*
- *solvent - dilute ammonia solution (see box) volume required will depend upon the containers you use as chromatography tanks (use the ammonia solution in a well ventilated room)*
- *melting point tubes or similar for spotting the coloured liquids*
- *beakers, or similar, of a suitable size to act as chromatography tanks*

Investigation: Using CHROMATOGRAPHY to separate the mixtures of colours in jelly babies

SAFETY NOTE
DO NOT EAT ANY OF THE SUBSTANCES USED IN THIS INVESTIGATION.
YOU WILL BE USING DILUTE ACIDS AND ALKALIS; WASH OFF ANY SPLASHES WITH PLENTY OF WATER.
TELL YOUR TEACHER WHAT HAS HAPPENED.
REMEMBER TO WEAR GOGGLES

Chromatography is an important method which is used to separate the different components in mixtures. Paper chromatography is one of the easiest techniques to carry out.

The substances that are used to colour food products are often mixtures of two or more chemicals. In this investigation you are going to find out the colours in the mixtures used to colour sweets.

Read the safety note before you begin.

Method to extract coloured liquid

1. You will need a 50 cm wool sample (from investigation C2), on which colours from jelly babies are 'stored'.
2. Place the sample of dyed wool in a small beaker. Add just enough dilute ammonia solution to cover the dyed wool.
3. Warm this mixture carefully for 5-10 minutes. You will notice that the ammonia solution becomes coloured. The wool will lose most of its colour.
4. Remove the wool so that you are left with just the coloured solution.
5. Continue to heat the solution so that most, but not all, of the liquid evaporates. Be careful not to heat to complete dryness. You must obtain a small amount of a very concentrated liquid. You will use this liquid for chromatography.
6. Repeat this process for as many colours as you can.

Chromatography of the coloured liquid

1. Cut the chromatography paper into strips of about 12 cm x 3 cm.
2. Dip a very fine piece of glass tubing into the concentrated coloured liquid.
3. Spot this liquid onto your piece of chromatography paper about 15 mm from the bottom of the paper.
4. Allow the spot to dry. Then apply another spot on top of the first. Do this at least 5 times so that a darkly coloured, but small, spot is left on the paper.
5. Pour the dilute ammonia solution into the container for the chromatogram to a depth of 3 mm. (The depth of solution must be such that it is below the level of the coloured spot on the chromatography paper.)

Handle the paper as little as possible.

Rest it on a clean surface. This piece of paper is big enough to investigate only one of the coloured liquids. You may decide to use a larger piece and investigate all of the colours at the same time.

Continued on next sheet

6. Place your chromatography paper with the coloured spot into the solvent as shown in the diagram.
7. The solvent will rise up the paper and carry the different colours different distances. This will only take a few minutes.