Chromatography of sweets

Learning objectives

1. Recap the keywords behind chromatography.
2. Investigate the dyes that are in different coloured sweets by successfully following a method.
3. Analyse the results and write a conclusion.

Introduction

Food colourings contain different dyes. Your aim is to investigate the number of different dyes in coloured sweets using chromatography.

Starter question

Match up the keywords to the definitions with a single line.

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| **Solute** |  | Two or more different substances that are not chemically bonded together. |
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| **Solvent** |  | A mixture of the solute dissolved in the solvent. |
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| **Solution** |  | A substance that the solute dissolves into. |
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| **Mixture** |  | A separation technique used to separate the pigments in a mixture, like ink or food colouring. |
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| **Chromatography** |  | A substance that is soluble (can dissolve in a solvent). |

Method

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| Step 1: An illustration of a long narrow strip of paper with the short side attached at the top to the centre of a horizontal pencil.Attach the chromatography paper to a pencil with a paperclip. | Step 2: An illustration showing the strip of paper and pencil inside a glass beaker, with the pencil resting across the rim of the beaker so that the paper is not touching the bottom of the beaker.Make sure the paper doesn’t touch the bottom of the beaker. | Step 3: An illustration showing the strip of paper and pencil, no longer in the glass beaker. The strip of paper has a horizontal line on it, 2cm from the bottom edge.Draw a pencil line 2 cm from the bottom. |
| Step 4: An overhead photograph of a spotting tile. Six of the wells in the spotting tile contain a single sweet. Each sweet is a different colour. Orange, yellow, purple, blue, red and green.  4  Put different coloured sweets in separate wells on a spotting tile. | Step 5: A photograph of a spotting tile. Six of the wells in the spotting tile contain a single sweet, the same as in step 4. Each well also has a small amount of water in the bottom. The dye from the sweets has coloured the water.  5  Add three drops of water to each well. | Step 6: A photograph of a spotting tile. Six of the wells in the spotting tile contain a single sweet and some water, the same as in step 5. Laying across the spotting tile are six narrow glass tubes (melting point tubes), each containing a small amount of the dyed water from one of the sweets.  6  Use a small paint brush or a melting point tube to pick up some of the coloured water. |
| Step 7: An illustration showing a close up of the bottom of the strip of paper attached to the pencil. On the horizontal line are four, equally spaced black ovals.Make a dot with the dye from each sweet along the pencil line. Make sure the dots don’t touch. | Step 7: An illustration showing four, equally spaced black ovals from step 7, labelled R, Y, G and B.Label each colour in pencil. | Step 9: An illustration of a beaker outline with measurements on the side. Water is in the bottom of the beaker up to the first line of the measure.Add 1 cm of water to the beaker. |
| Step 10: An illustration showing the strip of paper and pencil inside the glass beaker, with the pencil resting across the rim of the beaker so that the paper is not touching the bottom of the beaker. The water line in the beaker is below the black ovals and the horizontal line.Lower the chromatography paper into the water. The water should not touch the spots. | Step 11: An illustration showing the strip of paper and pencil inside the glass beaker as in step 10. A faint horizontal line (water line) is above the black ovals. A black arrow points upwards from the faint horizontal line.Leave until the water is near the top. | Step 12: An illustration of the long narrow strip of paper out of the beaker. The faint water line is near the top of the paper, below where the paper is attached to the pencil. There are to black ovals above the R. There is one black oval above the Y, there are three black ovals above the G and one on the line. There are two black ovals above the B. There is a pale grey background to the paper, which ends before the pencil. Immediately mark the water line with pencil. |
| Step 12: An illustration showing similar to step 12 but without the pale grey background to the paper. There is a pale horizontal line near the pencil. Leave to dry. | **Safety note:** Sweets are for laboratory use only and should not be licked or eaten. |  |

Conclusion questions

1. List the sweet colours that contained one dye.

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1. List the sweet colours that contained a mixture of dyes.

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1. Identify two sweets that contained the same dye.

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1. Suggest why some dyes separate out into different colours while others do not.

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1. Suggest why some colours move further up the paper than others.

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1. Give one way of improving the separation between the different spots.

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1. What common errors can be made during the procedure?

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1. Why is the start line drawn in pencil rather than pen?

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