

## Chromatography of sweets

This resource accompanies the article **Spoiling our Funfetti** in *Education in Chemistry*, which explains why sprinkles are not always bake-safe and why American candies are often more vividly coloured than sweets in the UK. The article is available to read at: [rsc.li/3IXqcl5](https://rsc.li/3IXqcl5)

The investigation is part of the **Nuffield Practical Collection**, developed by the Nuffield Foundation and the Royal Society of Chemistry. Delve into a wide range of chemical concepts and processes with this collection of over 200 step-by-step practicals: [rsc.li/43zLK5B](https://rsc.li/43zLK5B)

### Learning objectives

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

The starter questions activate learners' prior knowledge of chromatography and correct answers show success in meeting LO1.

A completed chromatogram showing separation of the dyes will assess LO2. Learners can take a photo of their chromatogram or stick it directly into their exercise books to evidence this LO.

The conclusion questions assess LO3.

### Introduction

This experiment goes down well with learners since it uses well known material normally used as confectionery. Learners begin by removing the dye from the surface of sweets of various colours, such as M&M'S®. They then put a spot of each onto a piece of chromatography paper, before allowing water to soak up the paper, separating out the component dyes.

The results of the chromatography show which dye mixtures are used to produce each colour for the sweets.

Learners should have a good basic understanding of chromatography theory and this practical can be a useful introduction to the method of separation. They can carry out the experiment in groups of two or three and it takes 30–40 minutes. Tell your learners that they should not eat the sweets under any circumstances.

## Scaffolding

The resource is available in its original format and as a support sheet. The support version has a match-up activity for the starter questions and an alternative method using step-by-step images. This reduces cognitive load as learners don't have to read a method.

**Note:** the support version provides a different way to dip the paper in the water and does not match the method in the original version, but it is less fiddly.

For an additional challenge, you can ask learners to calculate the  $R_f$  value using a given equation (slide 10). You could also discuss that the relative distance travelled by each 'spot' depends not only on its solubility in water but also on its attraction to the cellulose components of the paper.

## Technician notes

Separate technician notes, including additional information about preparation and disposal, are provided to download from: [rsc.li/3MU3TEf](https://rsc.li/3MU3TEf).

## Equipment

*Per group:*

- Beaker, 250 cm<sup>3</sup>
- Small soft paint brush
- Two paper clips (preferably plastic-coated)
- Chromatography paper, approximately 20 cm x 10 cm
- Pencil and ruler
- Communal hairdryer (optional)
- Supply of M&M's® of various colours
- Access to tap water in a beaker to use with the paint brush

## Safety and hazards

[Read our standard health and safety guidance](#) and carry out a risk assessment before running any live practical. Teachers have a responsibility to carry out their own risk assessment. Hazard classification may vary depending on supplier.

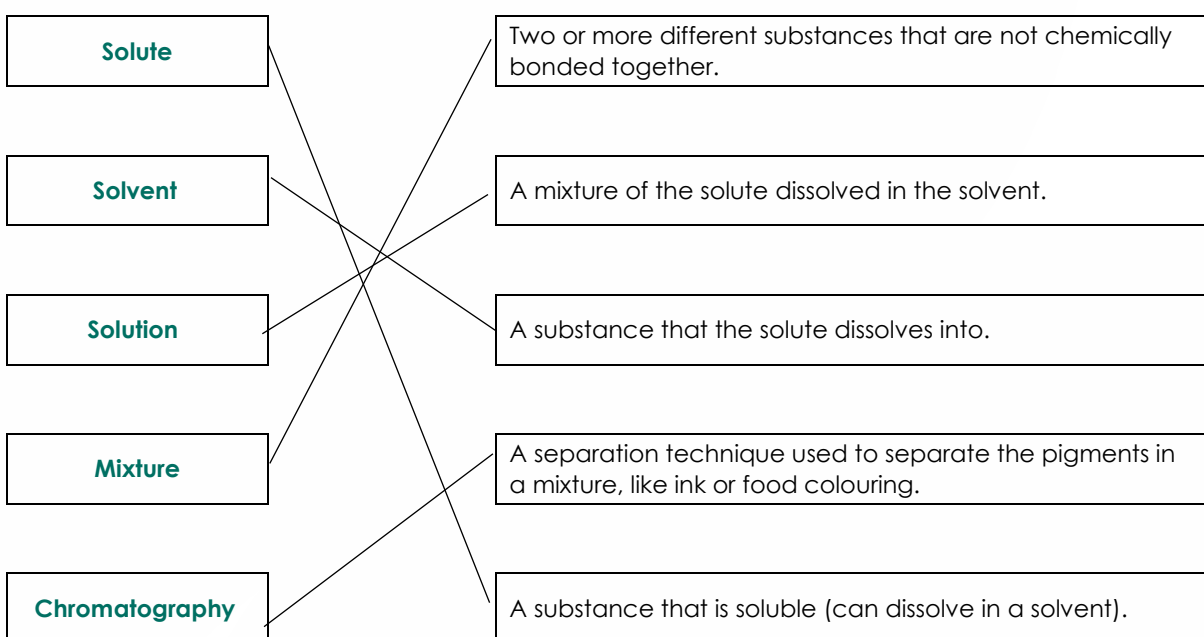
- Learners should wear safety glasses.
- Do not use Peanut M&M's® due to the risk of allergic reaction from peanuts.
- Learners should not attempt to eat or lick the sweets which are for laboratory use only.
- Check packaging for any possible allergy or hazard if you are using a different type of sweets or food colouring.

## Answers

### Starter questions

1. A substance that is soluble (can dissolve in a solvent).
2. A substance that the solute dissolves into.
3. A mixture of the solute dissolved in the solvent.
4. Two or more different substances that are not chemically bonded together (so can be separated using different techniques).
5. A separation technique used to separate the pigments in a mixture, like ink or food colouring.

### Support sheet



### Conclusion questions

1. Dependent upon the results of the practical. Any with only one colour.
2. Dependent upon the results of the practical. Any with more than one colour.
3. Dependent upon the results of the practical. Any with the same colour at the same height.
4. The dye has to be soluble in the solvent. If it doesn't separate it's either insoluble in the solvent, or only contains one dye.
5. Some dyes are more soluble than others.
6. Using a taller piece of chromatography paper in a taller beaker to check the spot isn't still a mixture/use a solvent other than water/use a different stationary phase.
7. Ink being submerged in water/ink being smudged.
8. Graphite is insoluble in the solvent (water) so won't dissolve.