

## CSI:Colours In Ink

### Key Stage 3

**Scheme of work unit:**      **7H**      Extend knowledge of dissolving and the Separation of the components of a solution and relate this to particle theory.

**Intended learning:**      **7H**      Investigate separating out the colours in ink using chromatography

#### **Introduction notes:**

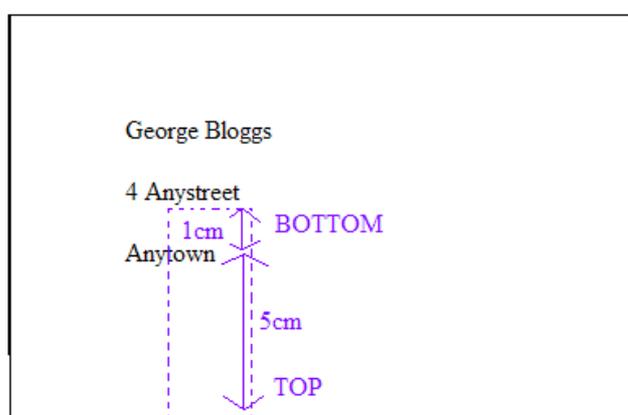
- Chromatography is the collective term for a family of laboratory techniques for the separation of mixtures.
- Paper chromatography is an analytical technique for separating and identifying mixtures that are or can be coloured, especially pigments.
- The technique is based on a small concentrated spot of the sample being applied to a piece of chromatography paper about 1 cm from the base.
- The paper is then dipped into a suitable solvent, such as ethanol or water.
- The solvent moves up the paper by capillary action. As the solvent rises through the paper it meets and dissolves the sample mixture, which will then travel up the paper with the solvent.
- Different compounds in the sample mixture travel at different rates due to different solubilities in the solvent, and are thus separated out on the paper.

#### **Information:**

- Washable pens are used in this activity because the pigments in the inks are soluble in water.
- Inks may appear to be a single colour, but are often composed of differently coloured pigments. Water can dissolve these pigments to effect a separation and produce a decorative pattern.
- The filter paper functions as a stationary phase on which the separation takes place whereas the water functions as a mobile phase to carry the pigments through the filter paper.
- Although colours of different manufacturers may appear to be the same, often different pigments and different ratios of pigments are used to produce the same colour. Thus, it is possible to tell what type of pen was used.

### Resources required:

- 3 sample containers
- Plastic pipettes
- Filter paper
- Scissors and a pencil
- Water
- Ethanol
- A Ransom note (labelled as Evidence No: 080)
- 2 different black pens (labelled as Evidence No: 081 & 082)
- Envelopes with the address “George Bloggs, 4 Anystreet, Anytown”, written on them using one of the pens. See diagram.



The area to be cut from the envelope needs to be of similar size to the filter paper.

The ink should be about 1cm from the bottom of the rectangular piece of paper and there should be plenty of paper above for the ink to travel up.

Labelling the top and bottom in pencil should avoid confusion.

### Practical notes

Containers should ideally be long and thin – we have successfully used sample vials. Pupils may need to be supervised when cutting the envelope. Ethanol should not be ingested, and is only required in small quantities.

### Further work

Link to other separation techniques, such as separating out the pigments in leaves. Or the different colours in food dyes.

### Answers:

4. Different compounds in the sample mixture travel at different rates due to different solubilities in the solvent, and are thus separated out on the paper.