

# Identification of Lipsticks using Thin Layer Chromatography

*Forensic scientists use chromatography to analyse some types of evidence left at the scene of crime. The techniques are usually very sophisticated (gas-liquid chromatography and high performance liquid chromatography), but sometimes the relatively simple technique of thin layer chromatography is used. Forensic scientists use this most often for the identification of fabric dyes and drugs.*

## 1. Scope

This procedure may be used to identify lipstick smears found on surfaces such as paper tissues, handkerchiefs and clothing.

## 2. Principle

Lipsticks consist of fats, waxes, oils, flavourings, perfumes, and dyes (mainly aluminium, calcium, or barium dyes). Identifying the lipstick responsible for leaving a smear can be done by straightforward colour matching. This will leave a small number, all of which give a reasonable colour match. The colourings in these lipsticks may be separated by thin layer chromatography. This colour analysis may be used to identify the lipstick used to make the smear.

## 3. Reagents

Methanol (**HIGHLY FLAMMABLE; TOXIC**)

Developing solvent:

50 cm<sup>3</sup> 3-methylbutan-1-ol (**HARMFUL; FLAMMABLE**)

50 cm<sup>3</sup> propanone (**FLAMMABLE; HARMFUL**)

25 cm<sup>3</sup> distilled water

5 cm<sup>3</sup> drops of 6 mol dm<sup>-3</sup> ammonia

(**CORROSIVE**).

Access to fume cupboard

## 4. Apparatus

400 cm<sup>3</sup> beaker

Large watch glass

Filter paper

Silica gel TLC plate

Sharp knife

5 small sample tubes with adhesive labels

5 small glass rods

Dropping pipette

Capillary tubes

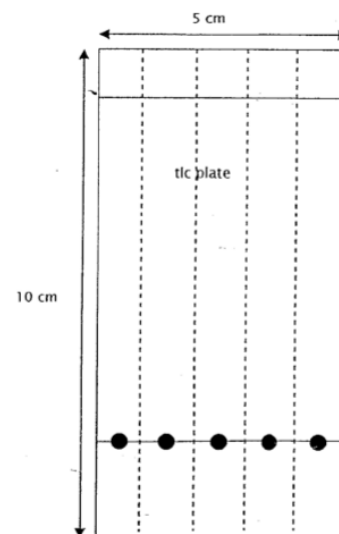
## 5. Health and Safety

Wear protective clothing and eye protection

A risk assessment must be carried out before starting work

## 6. Procedure

Cut a piece of tic plate (5x10 cm). Mark it with a pencil as shown by the solid lines in the diagram. Use a knife to score lines on the plate (in other words, remove the coating from the tic plate) as shown by the dashed lines in the diagram. These will help to prevent the 'lanes' from running into each other as the tic plate is developed.



Pour the developing solvent into a 400 cm<sup>3</sup> beaker to a depth of 1 cm. This should be done in a fume cupboard. Place two pieces of filter paper in the beaker so that they are leaning against the inside of the beaker. Cover with the large watchglass. Leave so that the atmosphere becomes saturated with the solvent.

Cut a 1 x 2 cm section of the lipstick sample on the tissue and put in a sample tube. Label with the lipstick name.

In a fume cupboard, add 5-10 drops of methanol to each sample. Use a glass rod to 'pound' the tissue so that as much of the lipstick dye goes into solution. Pour these solutions onto separate watchglasses and leave until most of the methanol has evaporated.

Use capillary tubes to put one very small drop of each of the coloured methanol solutions on the tic plate (see diagram).

Place the tic plate in the beaker containing the developing solvent and replace the cover.

Leave it until the solvent reaches the solvent front line on the plate (see diagram).

Remove the plate from the solvent and leave it to dry in the fume cupboard.

Once the plate is dry, draw and label each of the chromatograms.

## 7. Results

Compare the spots from the unknown lipstick sample with the four known colours lipsticks.

Calculate the retention factors  $\{R_f\}$  for spots found on the developed chromatogram using the formula  $R_f = X / Y$

where X = distance moved by 'spot' (measured to the centre of the spot), and Y = distance moved by the solvent

State which lipstick the 'unknown' appears to be.