



Lipstick Analysis

A lipstick print left at the scene of a crime can be a valuable piece of trace evidence. While lipstick analysis is not one of the most common tasks of an expert forensic scientist, some techniques commonly applied to a wide variety of chemical substances could be used.

A lipstick stain and partial lip print were recovered from the crime scene. You will be given

- an envelope containing a sample of the lipstick found at the scene of the crime, prepared for chemical analysis (marked "lipstick : evidence")
- an envelope containing a partial lip print transferred to a paper surface (marked "lip print : evidence")
- three tubes of lipstick -- one tube of the brand and color of lipstick used by each of the three suspects (marked "A", "B", and "C")
- three envelopes containing lip prints of each of the suspects on paper (marked "Suspect A", "Suspect B", and "Suspect C")

Part One: Chemical Analysis

You will use a technique known as paper chromatography to distinguish among the brands of lipstick used by each of the suspects and compare them to the lipstick found at the scene of the crime. In paper chromatography, a small amount of the substance to be analyzed is placed on a strip of paper. The paper is placed in a liquid solvent, which is absorbed into the paper. As the solvent moves up the paper, it carries with it the chemicals from the substance that readily dissolve in it. These chemicals travel at different speeds up the paper, and as they travel they separate. The pattern formed by the visible bands of separated chemicals will be different for different mixtures of chemicals -- like different brands of lipstick.

The paper chromatography process will take two days to complete.

Day One:

- 1) Cut 3 strips of filter paper (8" x 1/2').
- 2) Using a pencil (NOT a pen), draw a horizontal line 2 cm from one end of each strip.
- 3) Using a pencil (NOT a pen), label the 3 strips "A", "B", and "C".
- 4) Draw a thin, horizontal line of the appropriate lipstick on each strip (tubes are labeled "A", "B", and "C"). Remove the strip from the envelope labeled "lipstick : evidence". Use a pencil to label this strip "D".
- 5) Add enough chromatography solvent (50% acetone/50% rubbing alcohol) to each of 4 clean, glass, 30ml beakers (other very small glass containers are OK) so that the height of the liquid in the beaker is approximately 1 cm. **NOTE: Chromatography solvent produces unpleasant, noxious fumes. Use in a well-ventilated area or under a hood. Both acetone and rubbing alcohol are flammable.**
- 6) READ THIS ENTIRE STEP BEFORE COMPLETING. Place paper strips in the beakers – one strip per beaker. The strips should be placed with the lipstick line toward the bottom of the beaker but not touching the liquid. Fold the strips over the lip of the beaker and cover with a plastic petri dish. Make sure that strips are not touching each other and that they are not flattened against the side of the beaker. Either of these conditions will cause the pigments to run "streaky", resulting in inaccurate data.
- 7) Leave strips in beakers overnight.

Day Two:

- 8) Remove strips from beakers and dry for at least 5 minutes.
- 9) Add enough chromatography solvent to each of 4 **glass**, 50 ml graduated cylinders so that the height of the liquid in the cylinder is approximately 1 cm.. Place one dried paper strip in each cylinder so that the lipstick line is not touching or submerged in the solvent. Cover with small plastic petri dishes.
- 10) Remove strips after 45 minutes.
- 11) Allow strips to dry. Complete Lipstick Chemical Analysis Data Sheet.

Lipstick Chemical Analysis Data Sheet

Draw the pattern of bands you observed on each of the chromatography strips you analyzed. Draw the line 2 cm from the bottom of each strip. Use a ruler to determine the exact location of each band. Record the distance in millimeters from the starting line to the beginning of each band. Draw a line where the solvent reached on the paper, and measure the distance in millimeters from the starting line.

