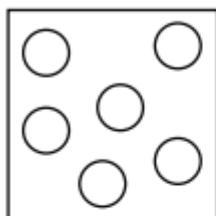
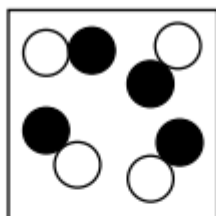


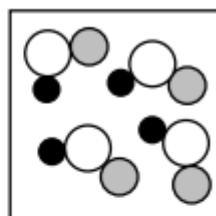
In each of these diagrams the circles represent atoms.



pure element

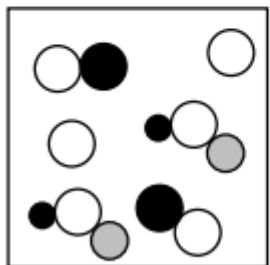


pure compound



pure compound

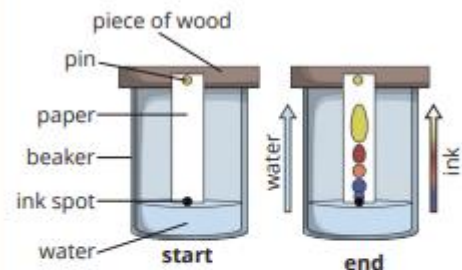
A pure substance consists of only one type of element or compound, and has a fixed melting and boiling point. Water is an example of a pure compound (made only of H_2O)



This **mixture** contains 1 element and 2 compounds mixed together. Because the different molecules are mixed together but not bonded they can be separated as each substance keeps its physical properties when mixed. The method chosen to separate a mixture depends on which physical properties of the individual substances are different.

Air, fruit juice, sea water and milk are **mixtures**.

Chromatography



Chromatography can be used to separate, for example, different dyes in ink. The colours are separated because they have varying **solubilities**.

The separate inks are carried different distances up the **stationary phase** (filter paper) by the **mobile phase** (solvent).

Flame tests

Different **metal** ions produce different flame colours when they are heated strongly.

This is the basis of flame tests. To carry out a flame test:

- dip a clean wire loop into a solid sample of the compound being tested
- put the loop into the edge of the blue flame from a Bunsen burner
- observe and record the flame colour produced

Ion present	Flame test colour
Lithium, Li^+	Red
Sodium, Na^+	Yellow
Potassium, K^+	Lilac
Calcium, Ca^{2+}	Orange-red
Barium, Ba^{2+}	Green
Copper, Cu^{2+}	Blue-green

Procedure



1 Place a strawberry in a zip-closure bag and remove most of the air before you seal the bag.



4 Continue mixing and mashing the bag in your hand.



7 Take a dropper or spoonful of the liquid in the cup and place in the test tube.



2 Mash the strawberry through the bag in your hand. Do not hit against the table as this might damage the DNA.



5 Place a piece of gauze over the opening of the cup, securing it with a rubber band.



8 Add a dropper for spoonful of the alcohol to the test tube. Take care not to tilt or tip the test tube; do not mix the two liquids.



3 Add 2 tablespoons of the DNA extracting solution

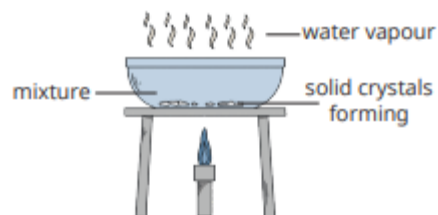


6 Carefully pour the strawberry mixture into the cup making sure to catch the solids with the gauze.



9 Observe the line between the strawberry mixture and the alcohol.

Evaporation



This method is used to separate a **soluble solid** from a **solvent**. The solution is heated, the liquid evaporates and the solid crystallises.

If the **evaporation** and **crystallisation** occur quickly, the crystals formed will grow rapidly and will be small.

If it can occur slowly, such as on a windowsill, then the crystals will have more time to form and be larger in size.

A solution of salt water can be separated using the evaporation method.

Each person has an **unique handwriting** just like a fingerprint, and it represents individual characteristic. Some people may share a few similar writing characteristics, but the likelihood of the same handwriting is rare or even impossible.

How to analyse handwriting.

1. Letter Form

Letter form involves elements like slants, curves, comparable size of letters (between their height and width, tall and short letters), slopes and appearance of connecting lines. The connecting lines between letters differ among various individuals. The form of the letter also depends on its position in the word, and this helps the analysts to assess each letter.

2. Line Form

Line forms consist of smooth or dark lines which indicate the speed of writing and the pressure applied by the writer. These factors help the document examiners to analyze elements like consistency to determine the original writer.

3. Formatting

Formatting includes the spacing between letters and words, the placement of words in a sentence as well as the space a writer leaves on the margins. It also involves the spacing between lines to check if the strokes in lines have similarities. Other elements to consider include spelling, grammar, phrasing as well as punctuation.

Type of blood splatter	Caused by?	Examples
Passive	Gravity	Droplets, pools & trails
Projected	Force is applied through or to an object.	Stabbings, gunshots, blood leaving mouth or nose
Transfer/contact	Coming into contact with a blood covered surface.	Bloody handprints & footprints