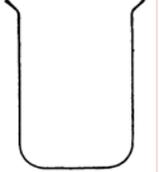
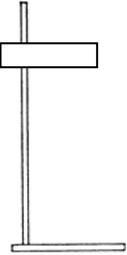
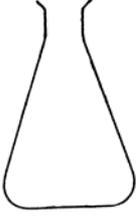
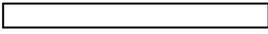
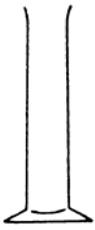
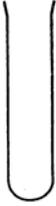


Skills in Science

- Safety:** Do NOT enter or leave the lab without permission from a teacher. Keep the gaps between tables clear of stools and bags. Never run in the lab. Do not throw things around in the lab. Always wear eye protection when doing experiments. Never taste anything in the lab unless your teacher tells you to. Do not eat or drink in a lab or chew gum. Shoes must always be worn in the lab. Always wash your hands after experiments. Always wipe your bench clean if you spill anything. If a chemical gets on your skin wash it off at once. Always leave the laboratory clean and tidy. REPORT ALL ACCIDENTS IMMEDIATELY TO YOUR TEACHER.
- Lab equipment.** (Always draw 2D) Drawings below are NOT to scale.

			
Beaker - A general purpose container with a pouring lip.	Boss, clamp and stand – to hold other apparatus steady.	Conical flask – often used to collect the liquid from filtering	Evaporating basin - Used to evaporate a liquid from a solid.
			
Bunsen - Used to heat materials.	Filter funnel - Used to separate a liquid from a solid.	Heat proof mat - For protecting the bench.	Tripod - Things are placed on this to be heated.
			XXXXXXXXXXXX
Measuring cylinder – Used to measure volumes accurately	Test tube - Used to carry out tests in small amounts.	Boiling tube - Used to heat liquids in small amounts.	Gauze - Used to spread the heat evenly.

- **Parts of a Bunsen burner, how to use a Bunsen burner, comparing Flames** The

Bunsen burner has three different flames.

- the yellow flame (air hole closed)
- the quiet flame (air hole half open)
- the blue or roaring flame. (air hole fully open)

The yellow flame is not used for heating because it leaves a covering of soot on the object being heated, and it is not a very hot flame. The Bunsen burner is left on this flame when it is not being used for heating. The quiet flame is the one usually used for heating. The blue or roaring flame is the hottest flame and is used for very fast or intense heating.

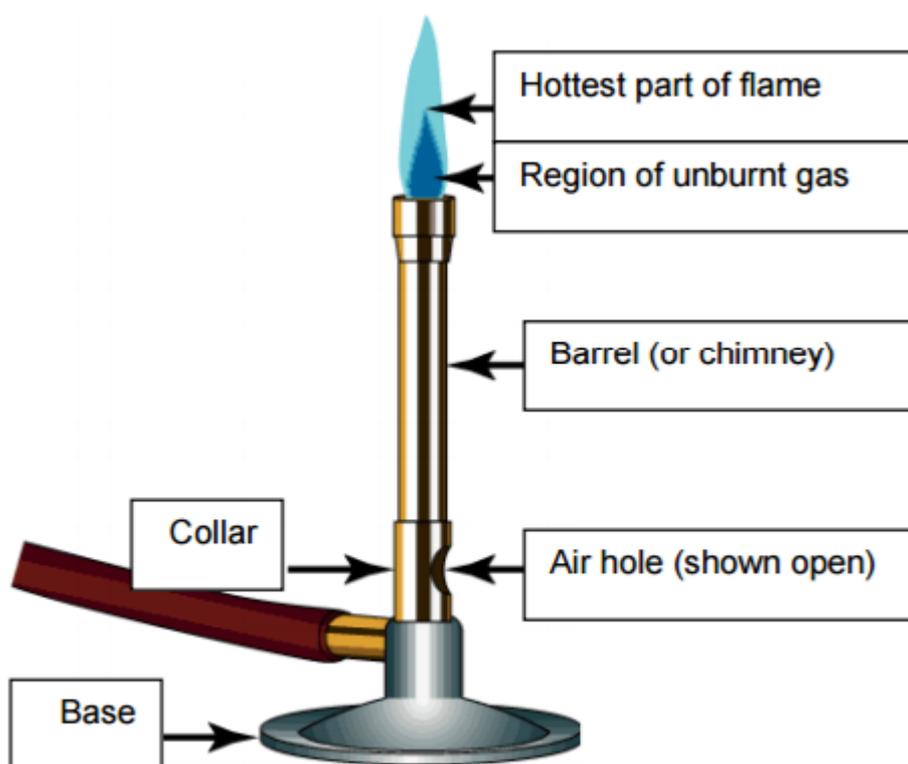
Instructions for Lighting

Collect a Bunsen Burner. Connect the rubber tubing to the gas tap.

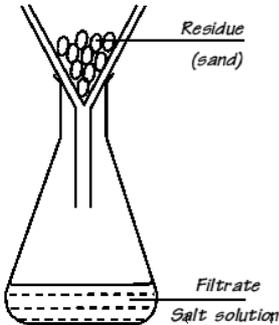
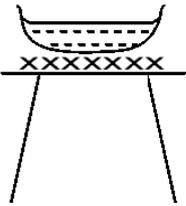
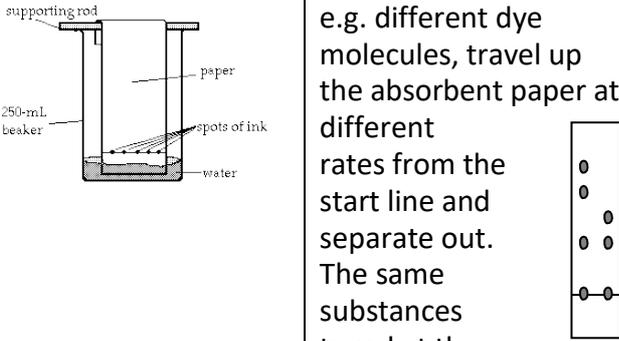
Make sure that the air-hole is very slightly open by turning the collar.

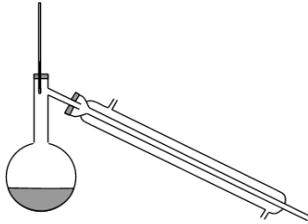
Turn the gas tap full on AND Light the Bunsen burner with a lighted splint at arms' length, about 5 cm *above* the top of the barrel.

Close the air hole to make the yellow flame (safety flame).



- Matter is every substance in the universe. Some substances are elements, e.g. silver (made of only one type of atom), others are compounds e.g. water H₂O or salt (NaCl) (made of more than one type of atom chemically joined together). However most substances are mixtures e.g. soil, air, tap water, cola drink. Often these mixtures can be separated out using suitable techniques.
- Soluble and Insoluble: A substance that dissolves is said to be soluble. E.g. When sugar and water mix they form a **solution**. The sugar is called the **solute**. The water in which the sugar dissolves is called the **solvent**. A substance that does not dissolve is said to be **insoluble**. Insoluble substances do not mix in water. They usually sink in water (settle out on), and others float on top. Insoluble mixtures do not form solutions but form **suspensions** instead. E.g. when mud and water mix the mud does not dissolve in water. If it is left to settle for a while it will eventually sink to the bottom. There is a limit to how much of any solid can dissolve in water or other liquids (its **solubility**) at a particular (given) temperature. When no more of a solid will dissolve, the solution is called **saturated**.
- Separation techniques. The separation of substances depends on differences in their physical properties; for example, one solid may be soluble and the other insoluble. Separation techniques: dissolving, filtering, evaporating, distillation, magnetic separation, and chromatography.

Technique	Diagram	How it works	Example
Sieving		Separates different sized objects depending on the size of the holes	Peas from water, pasta from water
Filtering		This uses a special paper with very small holes. The solid particles won't fit through. It is held in a filter funnel. The liquid that passes through is called the filtrate.	Sand from sea water.
Decanting		Decanting is the separation of a liquid from large dense insoluble solids by pouring off the liquid. The denser material is allowed to settle and the liquid is carefully poured off.	Water from a mixture of coarse sand and water.
Centrifuging		Tubes are spun very fast in a machine and the denser substances are forced to the bottom	Cream from milk, blood cells from plasma
Evaporation		The water is heated and evaporates and leaves the dissolved substance behind	Salt from salt solution
Chromatography		Different substances, e.g. different dye molecules, travel up the absorbent paper at different rates from the start line and separate out. The same substances travel at the same rates.	Separating the inks in pens into their component colours: Analysis of food dyes in lollies.

Distillation		The water in ink evaporates, passes into the condenser where it is cooled and the water condenses. It is collected in a beaker placed under the end of the condenser. The dyes are left in the flask.	Water from ink. This can also be used to purify water from sea water because the dissolved salt has a much higher boiling point and will not evaporate with the steam.
Magnetic separation		Iron is one of 3 metals that are magnetic. (The other 2 are cobalt and nickel).	Iron from plastic, iron filings from sulfur powder. It is used in recycling to recover iron and steel from waste. A powerful magnet pulls out magnetic materials as "rubbish" goes past on a conveyor belt.

Given a mixture of sand and salt, how would you separate them? Remember that sand is insoluble in water, while salt is soluble.

Add water to the mixture and stir. The salt dissolves but the sand does not. Pour into a filter paper cone. The sand is trapped in the filter paper. Rinse it with distilled water to remove all the salt through the filter paper. Dry the wet sand to have pure sand. All the salt passed through the filter paper dissolved in the water, as salt solution. Evaporate the water by heating by heating the salt solution in an evaporating basin. The residue left behind is pure salt.

A student carried out chromatography using 2 different black pens. What did she find out?

Black ink is a mixture because both inks separated into 2 or more separate dots. One ink was made up of three dyes (left sample), the other was made up of 2 dyes (right sample). One of the dyes was the same in both inks because it travelled the same distance.

