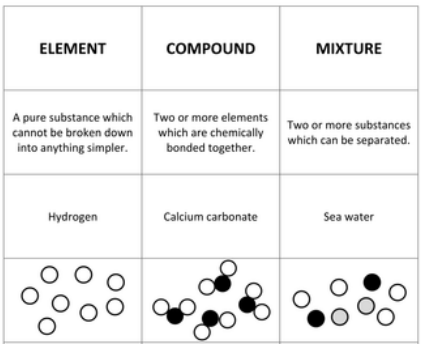
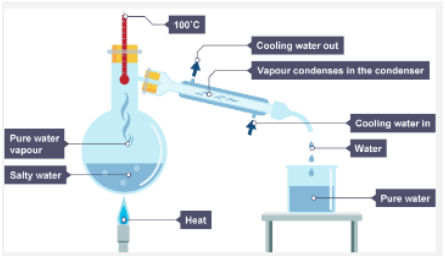
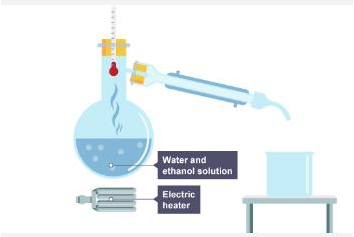
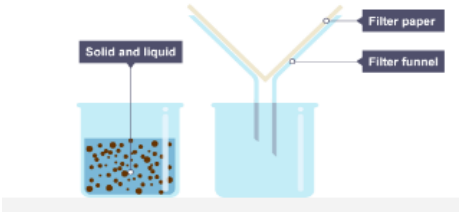
Chemistry Notes

Edexcel IGCSE

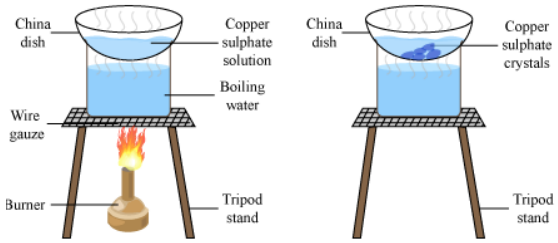
Chapter 1b – Elements, Compounds and Mixtures

1b Elements, compounds & mixtures	
1.8 – Understand how to classify a substance as an element, compound or mixture	
	This is because a mixture contains different components, each with a different boiling point. – eg ethanol boils before water so in a mixture won't all boil at 1 point
1.9 – Understand that a pure substance has a fixed melting and boiling point, but that a mixture may melt or boil over a range of temperatures	
1.10 – Describe these experimental techniques for the separation of mixtures:	• **Simple distillation** ▪ Use = Separating liquid from a solution eg water from saltwater ▪ Process: Solution is heated, vapour will evaporate and rise ▪ Vapour passes through **Liebig** condenser, cools and forms liquid which collected in a beaker ▪ Solute left behind (salt) as residue, pure water in the beaker
	
	• **Fractional distillation** ▪ Use: Separating two + Liquids. They both must be **miscible** (mixable) – eg separating ethanol and water ▪ Process: Heated to point where the one with the **lower boiling point** will boil off – other one left behind. Condenses and forms liquid in the other container
	

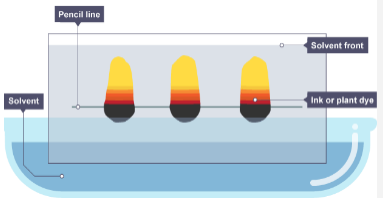
- **Filtration**
  - Use: Separating undissolved solid from mixture of solid & liquid eg sand and water
  - Process: Put mixture on filter funnel above beaker. Liquid will pass through = **filtrate**
  - Solid left on the funnel = **residue** (too large to pass through pores)



- **Crystallization**
  - Use: Separating dissolved solid which is highly soluble in hot solvent from a solution – eg Copper(II) sulfate from water
  - Process: Solution is heated and thus solvent evaporates until a **saturated solution** is created
  - This is cooled and solubility decreases = solid crystals form slowly. Collect and let dry



- **Paper chromatography**
  - Use: Separate substances with different solubilities in **the same solvent** eg coloring inks
  - Process: Pencil line is drawn, spots of ink (which is a mixture of other inks) placed. When lowered into solvent which travels up the paper, color substances will travel with the solvent.
  - Dif substances = Dif solubilities so travels up different rates with the solvent = spread out



1.11 – Understand how a chromatogram provides information about the composition of a mixture

- The paper left at the end is called a **paper chromatogram**. If there are multiple spots on the chromatogram then the original substance was **impure.** If only one dot = **pure substance**

1.12 – Understand how to use the calculation of R_f values to identify the components of a mixture

- Rf stands for the **Retardation factor**
- It is the ratio of the distance traveled by the centre of a spot to the distance traveled by the solvent. Thus, if a dot is halfway its Rf is 0.5
- Each substance (pigments, colorings) have a specific Rf value in a solvent. Compare result with known Rf values to determine components of the mixture

1.13 – Practical: Investigate paper chromatography using inks/food colorings

- Refer to above – but use maths to determine Rf values. Note that it will be **different** for ethanol and water.
  - Test with leaves, black ink etc.