C8 Knowledge Organiser – 4.8.1 – Chemical Analysis

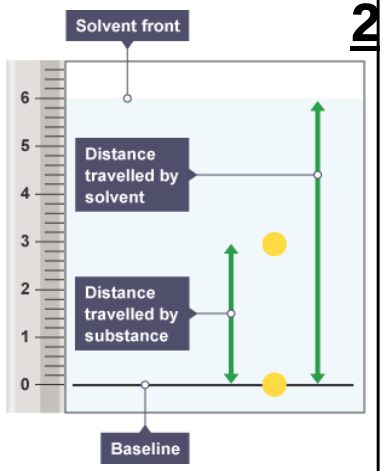
Pure substances 1

- Single element or compound, not mixed with any other substance
- **Pure substances melt or boil at specific temperatures**
- E.g. pure water will boil at 100°C
- Salt water will boil above 100°C as it contains an impurity

Chromatography (Required practical) 2

- Chromatography is used to separate mixtures based on their solubility
- **Stationary phase = filter paper**
- **Mobile phase = Solvent (e.g. water)**
- **Rf is the ratio of how far the dissolved substance has travelled**
- **Rf value must be less than 1**

$$R_f = \frac{\text{distance moved by substance}}{\text{distance moved by solvent}}$$



Chromatography basics 3

- **Baseline must be drawn in pencil – ink will run**
- **Solvent line must be below the baseline – or it will dissolve the solute (pigments)**
- **Used for identifying unknown substances against known samples**
- **Rf values compared – same Rf value means it is the same substance**

Formulations 4

- A formulation is a mixture that has been designed for a particular use
- **Each chemical in a formulation is measured carefully**
- **The incorrect amount of each component means that the formulation will not work**

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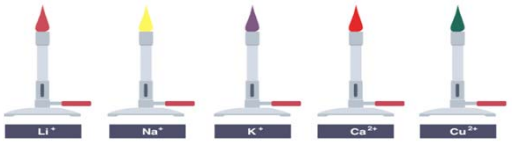
Gas	Test
Hydrogen	Squeaky pop – Burning spill held at the open end of test tube
Oxygen	Glowing spill inserted into test tube – spill re-lights
Carbon dioxide	Limewater – Turns from colourless to cloudy. Precipitate of calcium hydroxide forms
Chlorine	Damp litmus paper is bleached and turns white

Flame tests (Chem Only) 6

- **Lithium ion – Crimson flame**
- **Sodium ion – Yellow flame**
- **Potassium ion – Lilac flame**
- **Calcium ion – Orange – red flame**
- **Copper ion – Green flame**
- **If there is a mixture of ions the flame colour could be masked**



Identifying metal ions using Sodium hydroxide (Chem only) 6

Metal ion	Result with NaOH (aq)
Aluminium	White precipitate – dissolves in excess
Calcium	White precipitate
Magnesium	White precipitate
Copper (II)	Blue precipitate
Iron (II)	Green precipitate
Iron (III)	Brown precipitate

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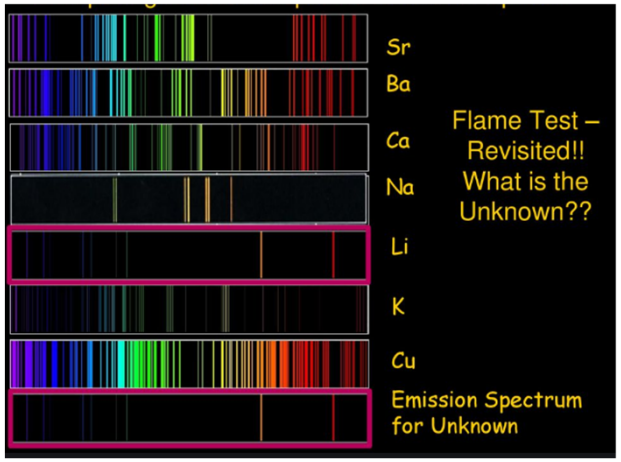
Non-Metal ion	Positive test for ion
Carbonate (CO_3^{2-})	Reacts with dilute acid to form carbon dioxide, which is then identified using limewater
Halide (Cl-, Br-, I-)	React with silver nitrate solution and nitric acid. Silver chloride is white, Silver bromide is cream and silver iodide is yellow
Sulphate (SO_4^{2-})	Produces white precipitate with barium chloride and HCl

Instrumental methods (Chem only) 8

- Instrumental methods = machines
- Elements and compounds can be detected and identified using instrumental methods
- **Instrumental methods are better than lab methods as they are fast, sensitive and accurate**

Flame Emission Spectroscopy (Chem only) 9



Used to analyse and identify metal ions in solution

The sample is put into a flame and light is given out and is passed through a spectroscope.

The output line spectrum can be analysed against knowns to identify ions and measure their concentrations

C8 Knowledge Organiser – 4.8.1 – Chemical Analysis - COMBINED

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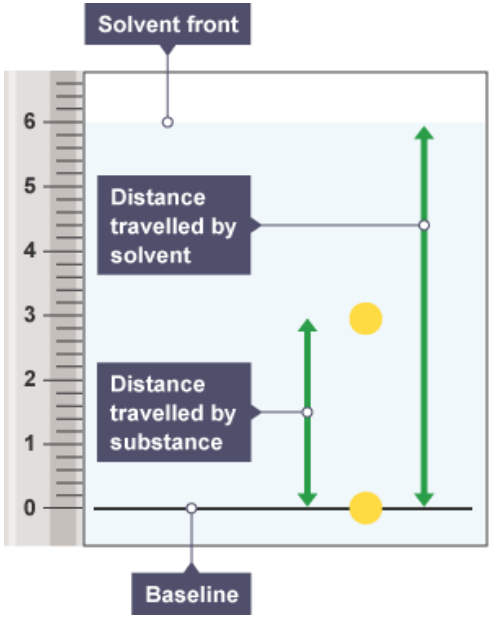

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