***Flame Emission spectroscopy*** - Match lines to find element in sample mixtures

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Testing for metal ions (cations) **i)** ***Flame tests (only work if single element)***

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  ***Ion*** | Li+ | Na+ | K+ | Ca2+ | Cu2+ |
|  ***Colour*** | Crimson | Yellow | Lilac | Orange | Green |

***ii) Adding sodium hydroxide***

|  |  |
| --- | --- |
| ***Ion*** | ***Precipitate colour*** |
| Calcium, Ca2+ | White |
| Copper (II), Cu2+ | Blue |
| Iron (II), Fe2+ | Green |
| Iron (III), Fe3+ | Brown |
| Aluminium, Al3+ | White then colourless |
| Magnesium, Mg2+ | White |

Testing for non-metal ions (Anions)

1. ***Detecting carbonates* (CO32-)**– Add acid and bubbles seen as CO2 gas produced

***ii)*** ***Detecting halide (Group 7) ions -*** Add nitric acid followed silver nitrate solution

|  |  |  |  |
| --- | --- | --- | --- |
| ***Ion*** | Cl- | Br- | I- |
| ***Precipitate*** | White | Cream | Yellow |

***iii)******Detecting sulphate ions (SO42-)*** - Addhydrochloric acid and then barium chloride. If ions present then a white precipitate forms.



***How does it work?*** There are 2 phases:

i) ***Mobile phase -*** A liquid (*often water*) which moves and can carry molecules along ***ii) Stationary phase*** - A solid (*filter paper*) which the molecules can attach to

During the process the mobile phase moves up the stationary phase, carrying with it substances that dissolve in it. The more attracted a substance is to the solvent the further it is carried up the stationary phase

***Calculating Rf values -*** The result of a chromatography is called a ***chromatogram*** and is used to measure the Rf value for each substance.

**Rf value = Distance travelled by the spot**

 **Distance travelled by the solvent**

**Used to separate the substances in a mixture, and can then be used to identify the substances and their purity.**

Gas Tests

Chlorine – Bleaches damp litmus paper, turning it white

Oxygen – Relights a glowing splint

Hydrogen – Produces a “squeaky pop” with a lighted splint

Carbon dioxide – Turns limewater milky (cloudy)

**FORMULATION** - A useful mixture made for a purpose using a recipe. Each substance in it is there for a reason and is present in a known quantity.

Examples of formulations:- *Paint, medicines, alloys,*

**PURE SUBSTANCE -** To a chemist a pure substance is something that **only contains 1 element or compound**

 *Testing for purity*

***i) Using melting / boiling points***

* The closer the melting or boiling point is to the pure substance the purer it is
* The smaller the range of temperatures over which a substance melts or boils is the purer it is
* Impurities in a substance will *lower the melting point* but *increase the boiling point*

***ii) Using chromatography***

If a substance produces more than 1 spot we know it is not a pure substance.

**Purity and formulations**

**CU8 – The rate and extent of chemical change**

**Chemical tests (Chemistry only)**

**Chromatography**