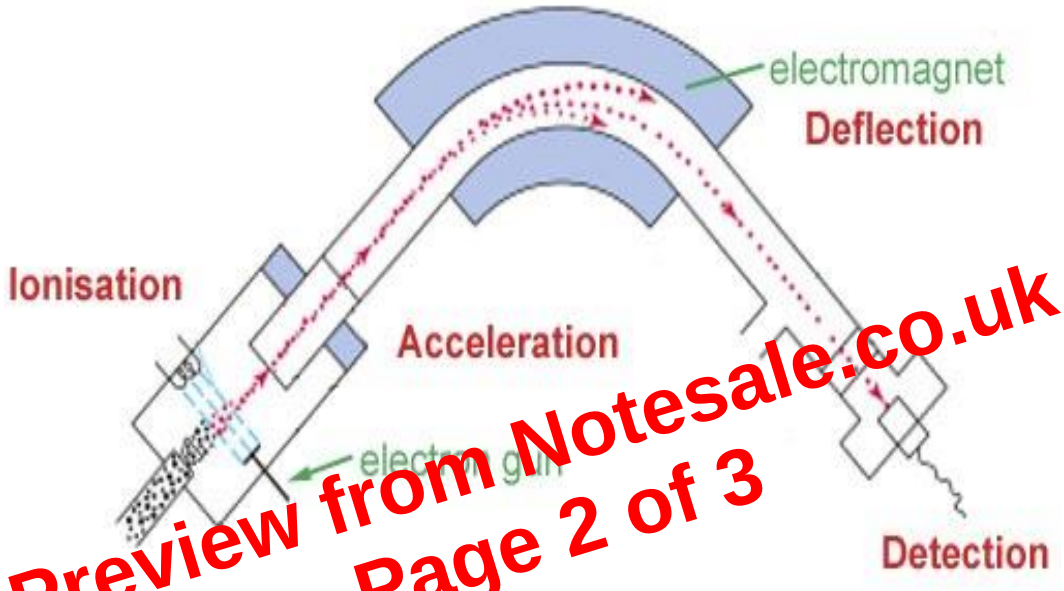
Mass spectrometry:

Process can be used to differentiate atoms based on the mass to charge ratio. Mainly used to differentiate isotopes but it can also be used to identify chemical elements present.

The process:

1.) **Vaporisation-** The sample is vaporised to allow for the next step of ionisation
2.) **Ionisation-** The sample is sent through the ionisation chamber in its gaseous form. Electrons are bombarded at the atoms, which in turn displace electrons and ionise them: $M + e^- = M^+ + 2e^-$
3.) **Acceleration-** Ions are accelerated so on average they all have the same amount of kinetic energy
4.) **Deflection-** Ions are differentiated by a magnetic field that separates them based on their weight. A lighter weight and greater charge gives higher deflection.
5.) **Detection-** Ions are detected electronically based on their M/Z giving a specific current detection range.



CIPW Normative mineralogy:

What is a Norm?

Major elemental analysis of a rock translated into percentages of hypothetical minerals with standardized compositions.

This method is used to predict what minerals will crystallise from a given magma. The elemental constituents are determined and a given normative, an idealised mineralogy is then calculated.

Assumptions taken:

- No hydroxide minerals exist in the rock as the magma crystallises under anhydrous conditions
- Pyroxenes and olivine's are thought to have the same Fe/Mg ratio
- Ferromagnesian minerals have no Al oxides
- Some minerals can't occur with others such as nepheline and olivine, which never appear with quartz

Uses:

- Identify mineralogy of ideal of aphanitic/ porphyritic rocks
- Degree of silica saturation can be assessed via the absence of feldspathoids, Quartz and feldspars