



**The Periodic Table**  
**Chemistry – Leaving Cert**  
**Quick Notes**

# The Periodic Table

An element is a substance that cannot be split into simpler substances by chemical means. Humphry Davy isolated potassium and sodium from their hydroxide compounds. Henry Moseley used the concept of atomic number to derive another definition for an element: a substance all of whose atoms have the same atomic number. Dobereiner suggested elements of similar properties could be arranged in groups of three. John Newlands arranged elements in order of atomic weight and proposed the law of Octaves. Dmitri Mendeleev produced a periodic table where elements were arranged in order of increasing atomic number. However, this meant gaps for undiscovered elements were left. The Periodic law, on the other hand, states that when elements are arranged in order of increasing atomic number, the properties of the elements vary periodically. The atomic number of an element is the number of protons in the nucleus of that atom. Mass number is the sum of the number of protons and neutrons in the nucleus of an atom of that element. Isotopes are atoms of the same element with different mass numbers due to different number of neutrons. Relative atomic mass is the average of the mass numbers of the isotopes of the element as they occur naturally, taking their abundances into account, and compared with one twelfth of the mass of the carbon-12 isotope. Mass spectrometry is a technique that measures the mass and abundance of atoms. The steps involved are vaporisation where the sample is converted to a gas, ionisation where the sample is converted into positively charged ions, acceleration whereby the positive ions are accelerated towards a negatively charged plate, separation where magnetic field deflects the beam of ions, and detection. Mass spectrometry can be used to identify compounds in drug testing. The Aufbau principle states that for when an atom in its ground state, the electrons occupy the lowest energy level available. Chromium and copper do not completely obey this principle. If an ion has a negative charge, it has gained one or more electrons. Whereas, when an ion has a positive charge, then it has lost one or more electrons. Pauli's exclusion principle states that no more than two electrons can occupy an orbital and they must have opposite spin. Hund's Rule states that when two or more orbitals of equal energy are available, electrons occupy them singly before filling them in pairs.