

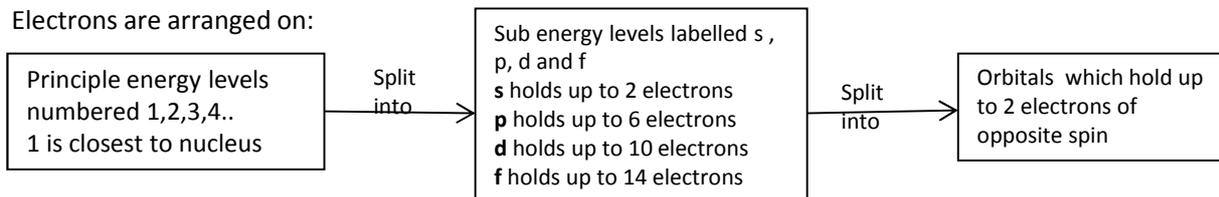
2.2.1 Electron Structure

Models of the atom

An early model of the atom was the Bohr model (GCSE model) (2 electrons in first shell, 8 in second etc.) with electrons in spherical orbits. Early models of atomic structure predicted that atoms and ions with noble gas electron arrangements should be stable.

The A-level model

Electrons are arranged on:



Principle level	1	2	3	4
Sub-level	1s	2s, 2p	3s, 3p, 3d	4s, 4p, 4d, 4f

An atom fills up the sub shells in order of increasing energy (note 3d is higher in energy than 4s and so gets filled after the 4s)
 $1s \rightarrow 2s \rightarrow 2p \rightarrow 3s \rightarrow 3p \rightarrow 4s \rightarrow 3d \rightarrow 4p \rightarrow 5s \rightarrow 4d \rightarrow 5p$

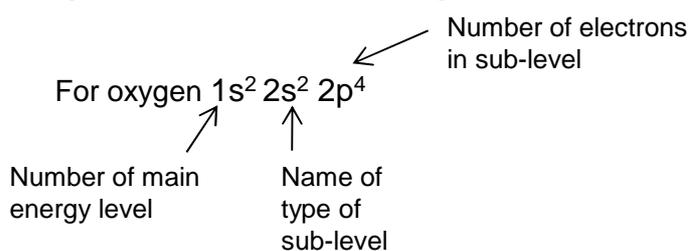
Shapes of orbitals

Orbitals represent the mathematical probabilities of finding an electron at any point within certain spatial distributions around the nucleus.

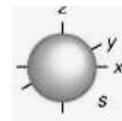
Each orbital has its own approximate, three dimensional shape.

It is not possible to draw the shape of orbitals precisely.

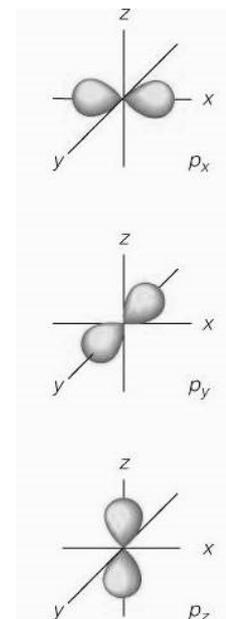
Writing electronic structure using letters and numbers



- s sublevels are spherical

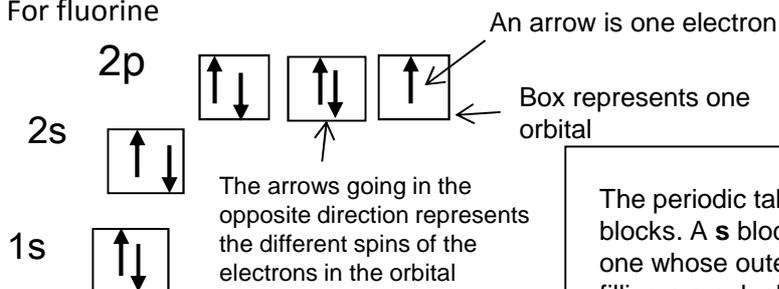


- p sublevels are shaped like dumbbells



Using spin diagrams

For fluorine



When filling up sub levels with several orbitals, fill each orbital singly before starting to pair up the electrons



The periodic table is split into blocks. A s block element is one whose outer electron is filling a s-sub shell

Electronic structure for ions

When a positive ion is formed electrons are lost
Mg is $1s^2 2s^2 2p^6 3s^2$ but Mg^{2+} is $1s^2 2s^2 2p^6$

When a negative ion is formed electrons are gained
O is $1s^2 2s^2 2p^4$ but O^{2-} is $1s^2 2s^2 2p^6$