Electron Configuration

Each orbital can have a maximum of 2 electrons. n = 1 has one sub-level which is called an s sub-level and which contains one s orbital. n = 2 has two sub-levels: 2s and 2p; n = 3 has 3 sub-levels: 3s, 3p and 3d; n = 4 has 4 sub-levels:4s, 4p, 4d and 4f, etc.

Orbitals have characteristic shapes. There is one s orbital which is spherical in shape, three p orbitals which are dumbbell shaped, called px, py pz, and arranged in the x, y, and z directions respectively, five d orbitals and seven f orbitals (both with complex shapes). The relative energies of s, p, d, and f orbitals with in a sub-level are: s < p < d < f.

s, p, d, f etc. is the common notation for sub-levels and orbitals within sub-levels. An orbital is an area of space around the nucleus in which an electron moves.

The maximum number of electrons in a main energy level n is 2n2:
1st energy level, n = 1; maximum 2 e-;
n = 2, maximum 8 e-;
n = 3, maximum 18 e-.

The electron arrangement (or configuration) indicates the number of electrons and their energy distribution. This determines an element's physical and chemical properties.

Main (or principal) energy levels, sub-levels and orbitals: The main energy levels, n are assigned whole number integers, n = 1, 2, 3, 4... . n = 1 represents the lowest energy level. Each main energy level contains n sub-levels and a total of n2 orbitals.

Figure 215 An illustration of the electron distribution in s- and p-orbitals

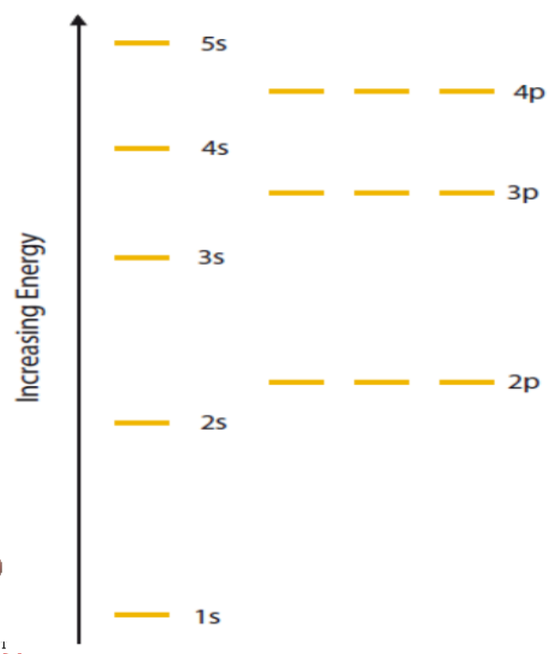

Figure 216
A summary of energy levels

Energy level	Types of sub-levels	Total orbitals	Electron capacity
1	s	1	2
2	s,p	1+3=4	8
3	s,p,d	1+3+5 =9	18
4	s,p,d,f	1+3+5 +7=16	32
n	n types	n^2	$2n^2$

Figure 216 The electron energy levels in a typical atom

Figure 220 The 'long form' of the periodic table