

**Hund's rule**

Electron – pairing in any orbital is not possible until all the available orbitals of a given such –shell contain one electron in each.i.e., the orbitals of a given sub shell are first filled singly and then the pairing of electrons in each orbital begins. This is known as Hund's rule. This rule helps us in writing the ground state electronic configuration of those atoms which have partially filled p,d (or)f sub –shells in them as illustrated in the following examples.

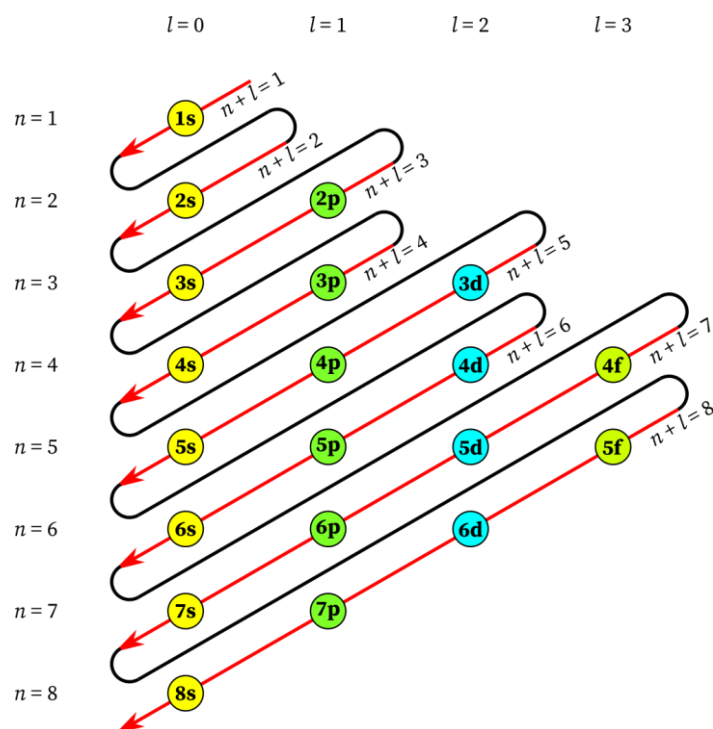
Atomic number	Element	1S	2S	2Px	2Py	2Pz	No.of. Unpaired electron
1	H	↑					1
2	He	↑↓					0
3	Li	↑↓	↑				1
4	Be	↑↓	↑↓				0
5	B	↑↓	↑↓	↑			1
6	C	↑↓	↑↓	↑	↑		2
7	N	↑↓	↑↓	↑	↑	↑	3
8	O	↑↓	↑↓	↑↓	↑	↓	2

**Sequence of energy levels:****Aufbau principle:**

The word aufbau in German means 'building up'. The building up of orbitals means the filling up of orbitals with orbitals with electrons.

The principle states that in the ground state of the atoms, the orbitals are filled in order of their increasing energies.

In other words, electrons first occupy the lowest energy orbitals available to them and enter into higher energy orbitals only after the lower energy orbitals are filled. The order may be remembered by using the method in fig.



Starting from the top the direction of the around gives the order of filling of orbitals. Alternatively, the order of increasing of energy of orbitals can be calculated from (n+l) rule explained below.

- The lower the value of (n+l) for an orbitals, the lower is its energy.
- If two orbitals have the same (n+l) value the orbitals with lower value of n has the lower energy.
- $1s < 2s < 2p < 3s < 3p < 4s < 3d < 4p < 4f$  etc.

orbitals	n	l	(n+l)
1s	1	0	1
2s	2	0	2
2p	2	1	3
3s	3	0	3
3p	3	1	4
3d	3	2	5
4s	4	0	4
4p	4	1	5
4d	4	2	6
4f	4	3	7