ATOMIC STRUCTURE - 05

Computer Science (Section – B)

16 – 03 – 2021 (1st Period)

Bohr-Bury Scheme: Bohr and Bury together forwarded an idea about the distribution of electrons in different orbits. According to this scheme;

1. The maximum number of electrons in an orbit is given by $2n^2$ (where, n is the orbit number i.e. 1, 2, 3, 4, 5, -----). i.e.

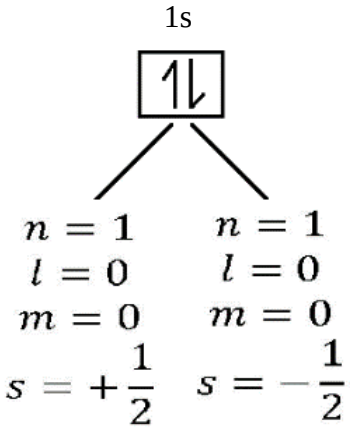
   Maximum number of electrons in K $(n = 1)$ shell = $2\times1^2 = 2$

   Maximum number of electrons in L $(n = 2)$ shell = $2\times 2^2 = 8$

   Maximum number of electrons in M $(n = 3)$ shell = $2\times 3^2 = 18$

   Maximum number of electrons in N $(n = 1)$ shell = $2\times 4^2 = 32$
2. The maximum number of electron in the outermost orbit or valence orbit or ultimate orbit will not be more than 8.
3. The maximum number of electron in the penultimate orbit will not be more than 18.
4. The maximum number of electron in the ante-penultimate orbit will not be more than 32.
5. This is not necessary for an orbit to be filled completely before starting to the next higher orbit. In fact electrons enter into the next higher orbit as soon as an orbit acquires 8 electrons.

Pauli's Exclusion Principle: The principle states that "no two electrons in an atom can simultaneously have the same set of all the four quantum numbers. For example: $_2$He – $1s^2$



It is thus seen that the three quantum numbers are same for the two electrons of He atom, whereas it differs in the spin quantum number.

Hund's Rule of Maximum Multiplicity: The rule states that electron first singly occupied in the orbitals of equal energy i.e. degenerate orbitals and then it is paired up with opposite spin. In other words, the pairing of electrons in the orbitals of equal energy i.e., degenerate orbitals takes place only when there is no availability of vacant orbitals for the incoming electron. For example:

p^4 ↿⇂ | ↿ | ↿

d^7 ↿⇂ | ↿⇂ | ↿ | ↿ | ↿

Aufbau Principle: *'Aufbau'* is a German word means 'construction' or 'building up'. The principle states that the "electrons enter into the orbitals on the basis of their increasing order of energy i.e. lower energy orbitals are field first".

The above principle can be well understood on the basis of *(n+l)* rule also called as Madelung rule or Janet rule. The rule states that:

1. Electron enters in that orbital first for which the value of *(n+l)* is minimum.
2. If the value of *(n+l)* is same for two or more orbitals, then electron enters in that orbital first for which the value of *'n'* is minimum.

The *(n+l)* rule can be schematically represented as below.