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# ORBITAL CONCEPT THEORY

The atoms combine by colliding with each other. But what does this mean on atomic level. This

situation refers to the process in which the two atoms comes so close to each other that they penetrate each other's orbital and form a new hybridized orbital where the bonding pair of electrons reside. This hybridized orbital has lower energy than the atomic orbital and hence are stable. It is in the minimum energy state. This partial penetration of orbital is known as orbital overlap.

The extent of overlap depends on the two participating atoms, their size and the valence electrons. In general, greater the overlap, stronger is the bond formed between the two atoms. Thus, according to the orbital overlap concept, atoms combine together by overlapping their orbital and thus forming a lower energy state where their valence electrons with opposite spin, pair up to form covalent bond.

The importance of orbital overlap was emphasized by Linus Pauling while explaining the molecular bond angles observed through experimentation and is the basis for the concept of orbital hybridization.

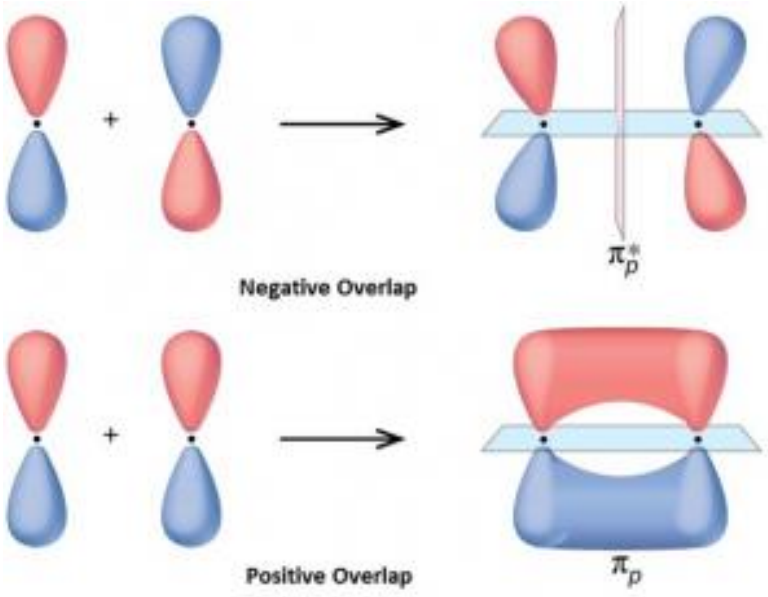
## Directional Properties of bond

The molecular bond angles were explained through the directional properties of bond. The molecule of hydrogen is formed by overlap of 1s orbital in head on collision.

## Overlapping of Atomic Orbital

When two atoms come in contact with each other to form a bond, their overlap can be positive, negative or even zero depending upon the phase and sign of the two interacting orbital.

1. **Positive Overlapping of Atomic Orbital –** When the phase of two interacting orbital is same, then the overlap is positive and in this case, the bond is formed. The phase of the two interacting orbital (+ or -) comes from the sign of orbital wave function and is not related to the charge in any sense.
2. **Negative Overlapping of Atomic Orbital –** When the phase of two interacting atomic orbital is opposite, then the overlap is negative and in this case, the bond is not formed.




3. **Zero Overlapping of Atomic Orbital –** When the orientation of two interacting atomic orbital is such that there is no overlapping of the orbital, that is

known as zero overlapping.