HYBRIDIZATION

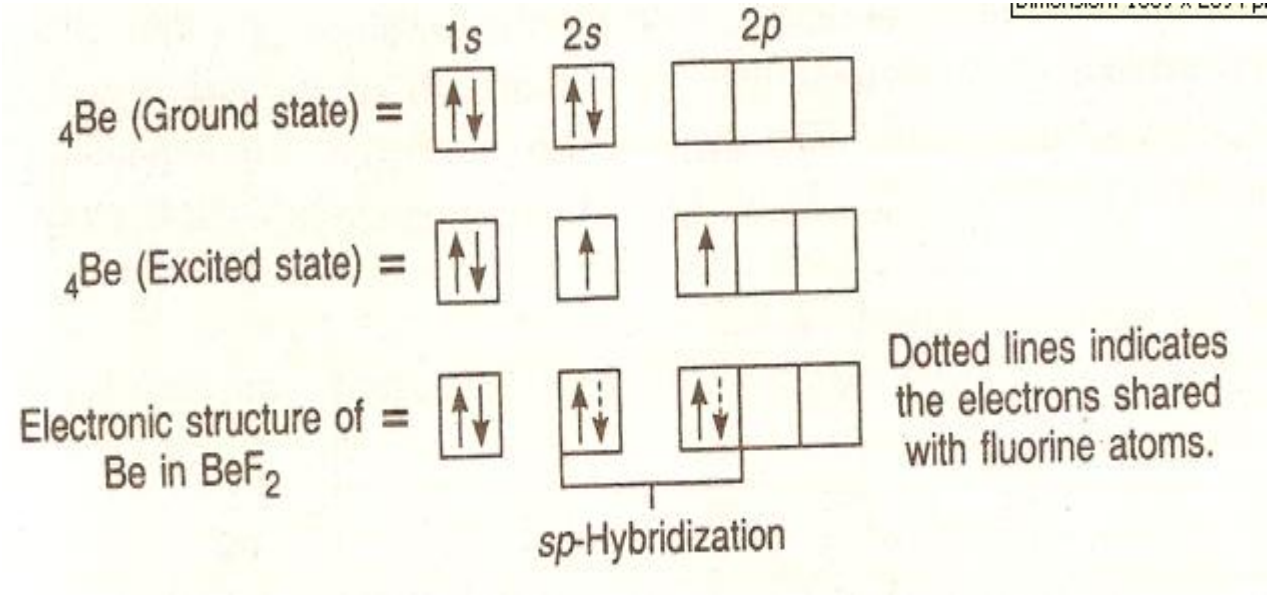
Types of Hybridization

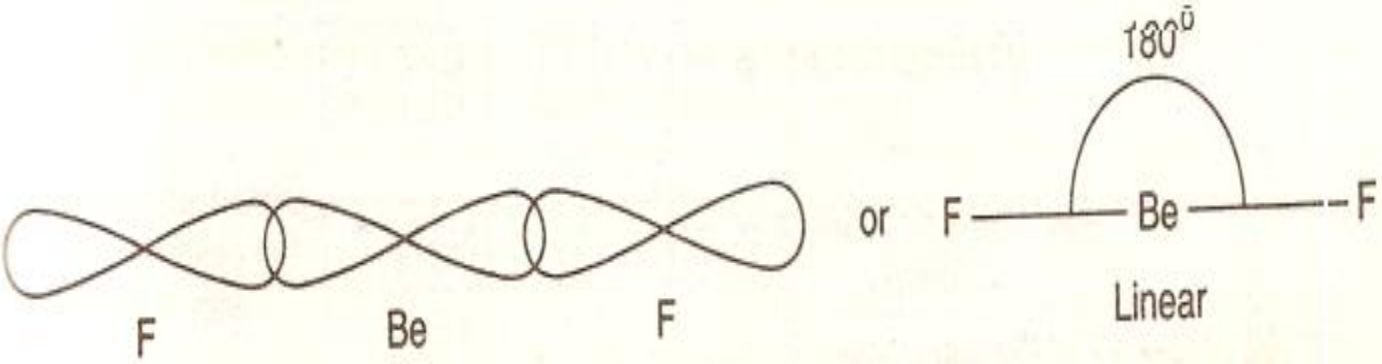
(1) sp-hybridization: The combination of one s and one p-orbitals to form two hybrid orbitals of equal energy is known as sp-hybridization.

Example: In BeF_2 Molecule the sp-hybridized orbitals of Be overlap with the half-filled orbitals of two fluorine atoms to give a **linear shape.**

HYBRIDIZATION

Structure of BeF_2 Molecule

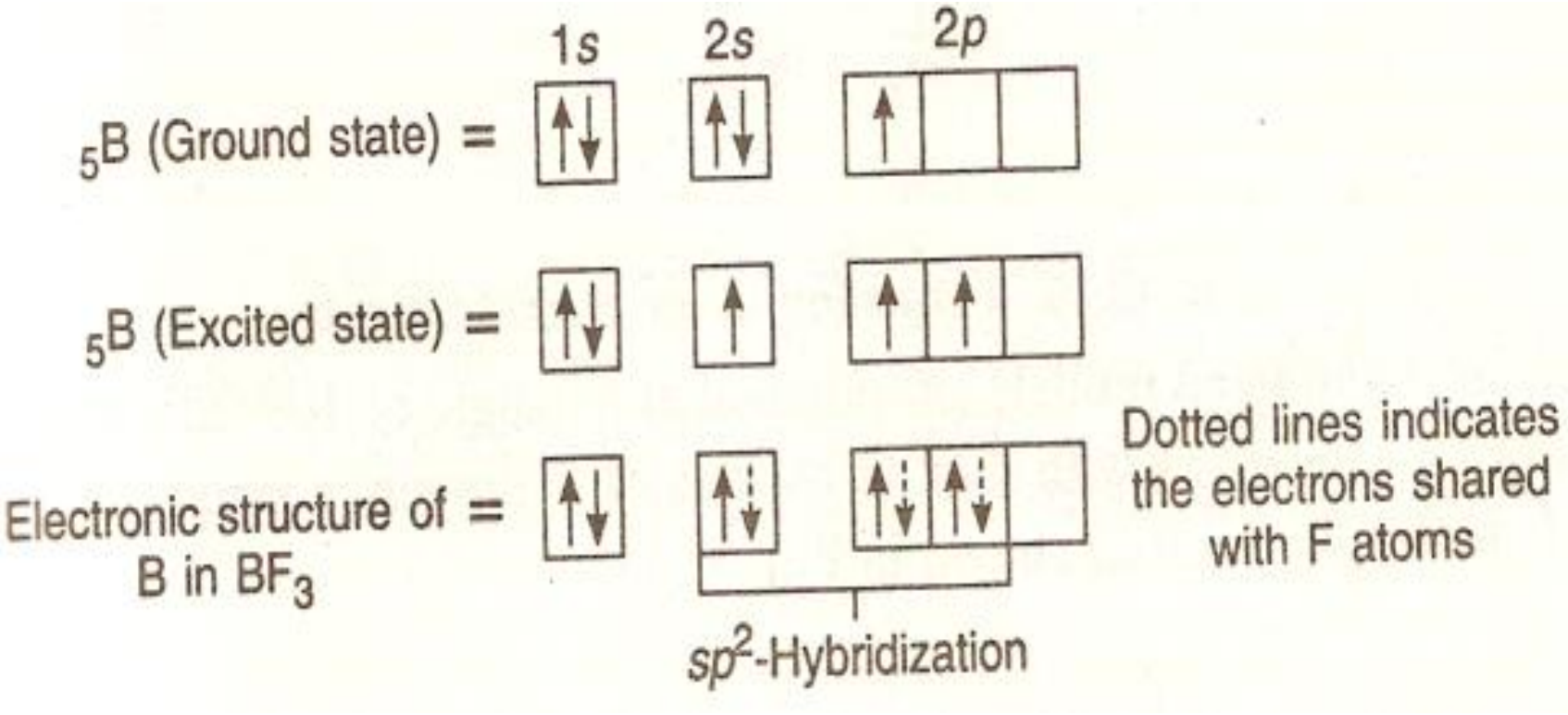




HYBRIDIZATION

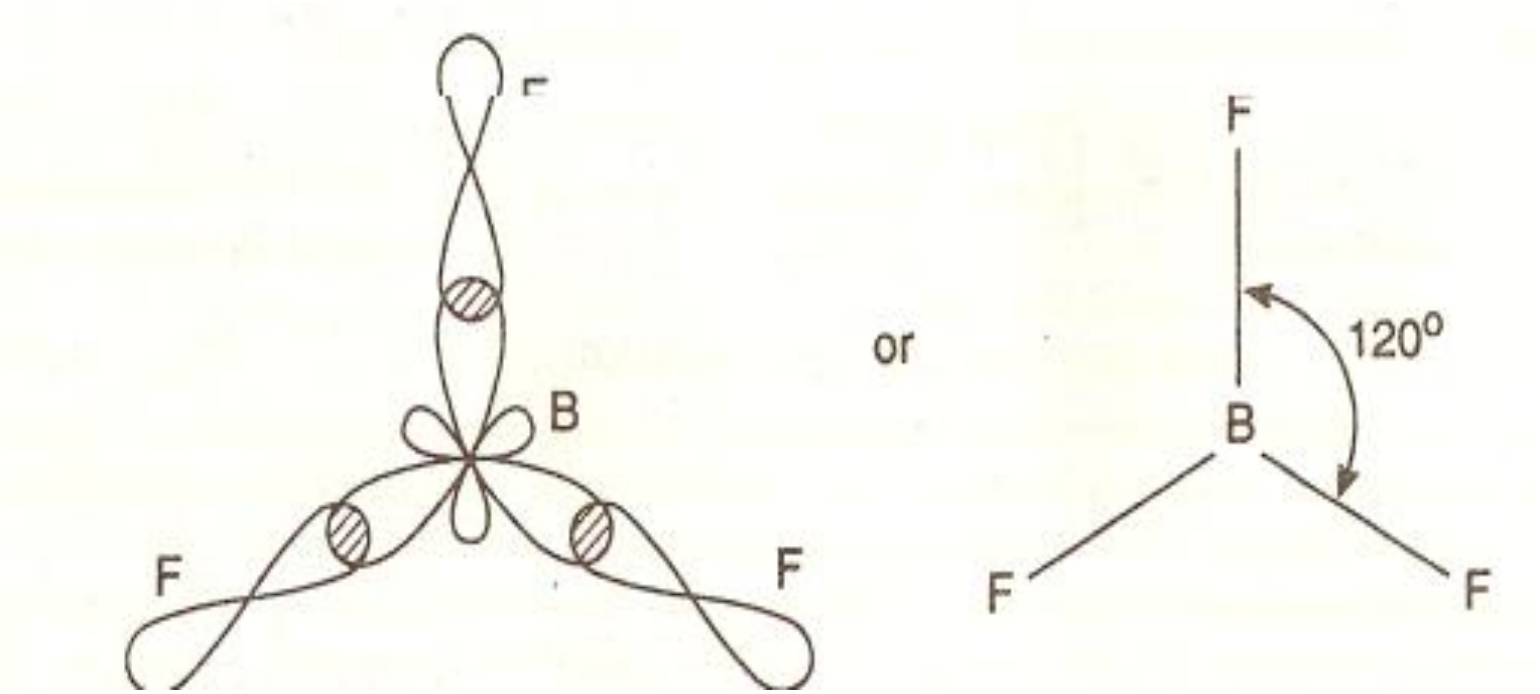
sp^2-hybridization: The combination of one s and two p-orbitals to form three hybrid orbitals of equal energy is known as sp^2-hybridization.

Example : BF_3 Molecule.



HYBRIDIZATION

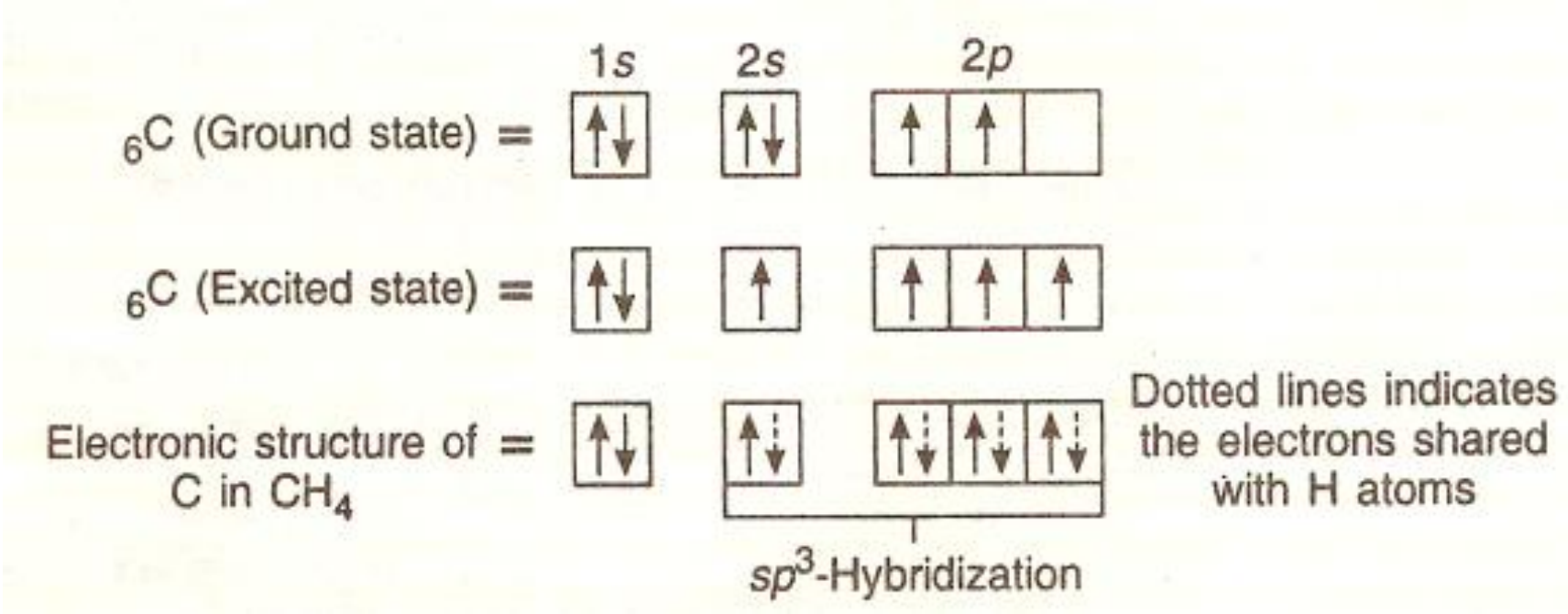
These sp2 hybridized orbitals are oriented at an angle of 120°. When three sp2 hybridized orbitals of B overlaps with three p-orbitals of fluorine, three σ -bonds are formed with bond angle 120°. The shape of BF3 molecule is thus trigonal planar



HYBRIDIZATION

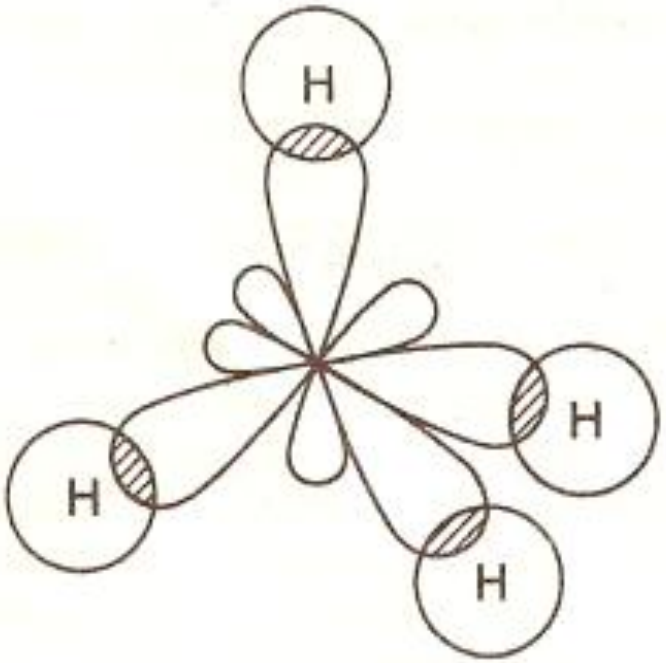
(3) sp3-hybridization: The combination of one s and three p-orbitals to form four hybrid orbitals of equal energy is known as sp3-hybridization.

Example: Methane (CH_4) molecule.

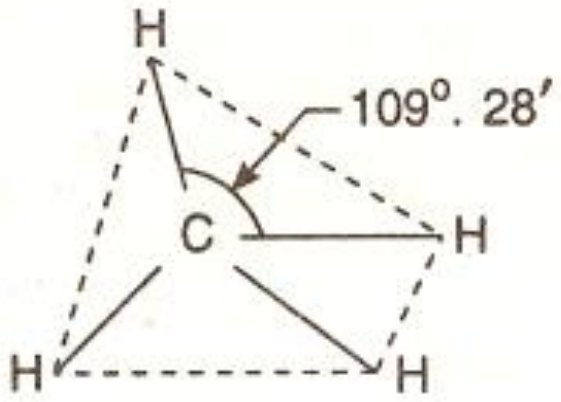


HYBRIDIZATION

These sp3-hybridized orbitals are oriented at an angle of 109°28'. When these four sp3 hybrid orbitals overlaps with four 1s orbitals of hydrogen, a symmetrical tetrahedral shaped CH4 molecule form.



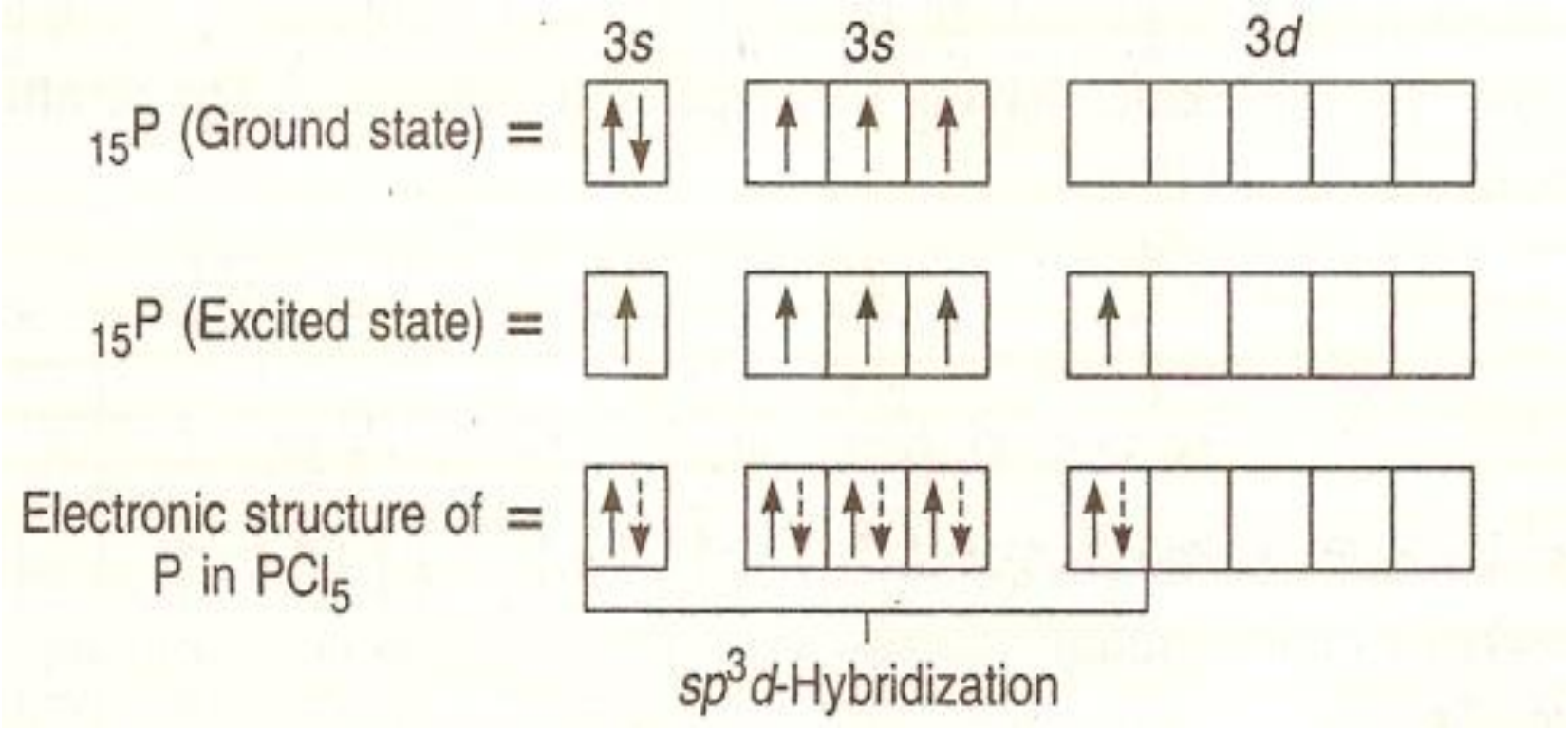
or



HYBRIDIZATION

(4) sp3d-hybridization: The combination of one s, three *p* and one d-orbitals to form five hybrid orbitals of equal energy is known as sp3d-hybridization.

Example: PCl_5 molecule.



HYBRIDIZATION

(5)sp^3d^2-hybridization : The combination of one s, three p and two d-orbitals to form six hybrid orbitals of equal energy is known as sp^3d^2-hybridization.

Examples : SF_6 Molecule.