



Energy among them to form १४ आषाढ कृष्ण, शनिवार, सं० २०७९
 four equivalent (i.e. of the same energy) orbitals called hybrid orbitals, and hence

“ This phenomenon of mixing of atomic orbitals and formation of new orbitals of equal orbitals formed are known as hybrid orbitals” These bonds are stronger than those obtained by the overlap of pure s or pure p orbitals

The four new bonds are directed towards the four corners of a regular tetrahedron and make an angle of $109^{\circ}28'$ to each other.

Now 1s orbitals of four H-atoms overlap with these hybrid orbitals to form CH_4 molecule.

Rules For hybridisation

(1) Only orbitals of similar energies belonging to the same atom or ion can hybridise together.

(2) no. of hybrid orbitals produced is equal to the no. of atomic orbitals mixed together.

(3) Hybrid bonds are stronger than the single non hybridised bonds of comparable energy

(4) Most of the hybrid orbitals are similar but they are necessarily identical in shape. They differ from one another in their orientation in space.

(5) For equivalent hybrid orbitals, the orientation in space is determined by

(a) the no. of hybrid orbitals obtained

(b) which of x, y, and z-axis are

There is more to life than increasing its speed.

Preferred by the orbitals when pure.

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type of hybridisation we can tell about the geometry and bond angles of a molecule.

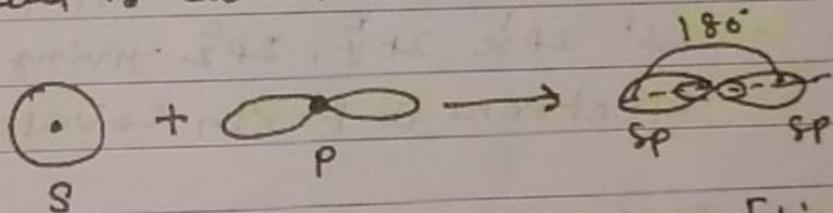
Once an orbital has been used to build a hybrid orbital is no longer available to hold electrons in its pure form.

Overlapping of hybrid orbitals forms σ -bond.

Types of hybridisation

① sp-hybridisation [Linear or diagonal hybridisation]

Definition :- The combination of one 's' and one 'p' atomic orbitals to form two sp hybrid orbitals is called sp-hybridisation.



[sp-hybridisation [Linear]]

Properties of sp-hybrid orbitals

① Two sp-hybrid orbitals are equivalent in energy.

② Their arrangement is linear (or diagonal) and they make an angle of 180° with each other.

③ Each sp-hybrid orbital is stronger than the pure s and p

S	M	T	W	T	F	S	S	M	T	W	T	F	S
1	2	3	4	5	6	7	8	9	10	11	12	13	14
15	16	17	18	19	20	21	22	23	24	25	26	27	28
29	30												

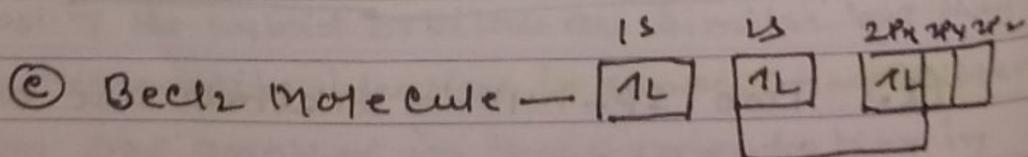
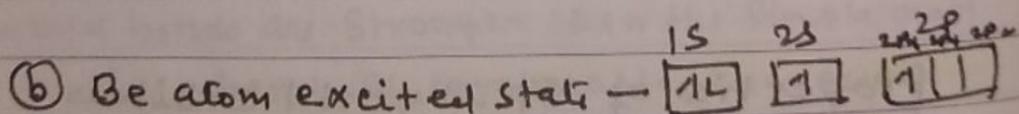
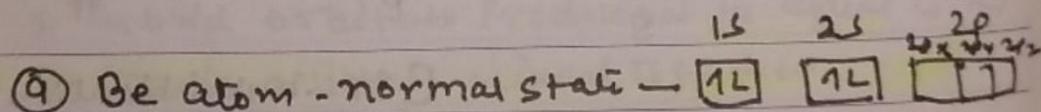


which it is formed.

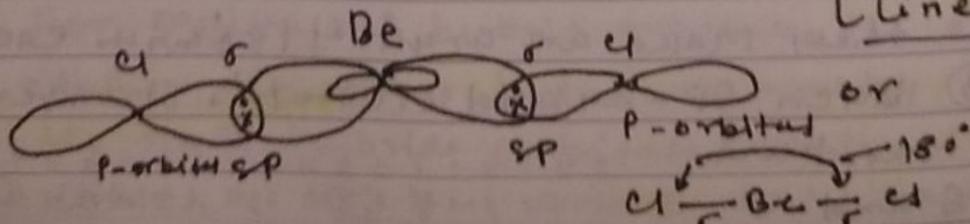
(iv) sp-hybrid orbitals has two lobes, one of which larger than the other.

Example [Formation of BeCl₂ Molecule]

In BeCl₂ molecule, the central atom is Be whose electronic configuration in ground state is 1s², 2s². There are no unpaired electron in this configuration hence Be-atom cannot form any covalent bond. From this it follows, that in BeCl₂ the Be-atom is not in the ground state but in the excited state, under excited state its electronic configuration is 1s², 2s¹ 2p¹ giving two unpaired electrons to form covalent bonds.



sp-hybridisation
[Linear]



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These two atomic orbitals than hybridise to form two linear sp -hybrid orbitals which are singly filled. Each of these hybrid orbitals overlaps with singly filled $3p_z$ atomic orbitals of each Cl-atom ($Cl \rightarrow 1s^2, 2s^2, 2p^6, 3s^2, 3p_x^2, 3p_y^2, 3p_z^1$) to form Be-Cl sigma bonds. Both these bonds are coplanar and are at 180° to each other. Thus $BeCl_2$ molecule has linear shape.

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