



Hybridization of elements involving d orbitals

LESSON 12 OF 12



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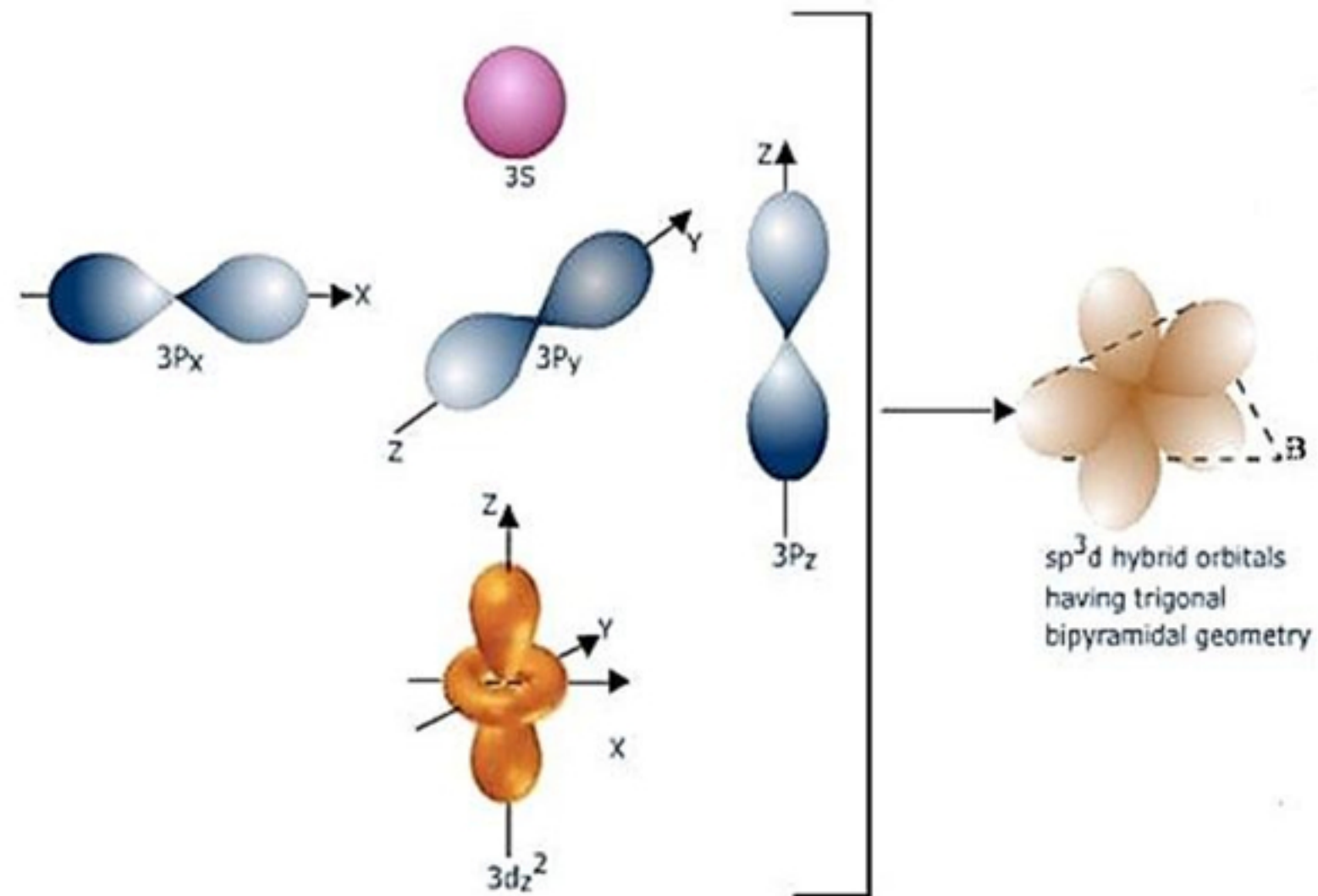
Hybridisation of Elements involving *d* Orbitals

LESSON 12

BY Rashmi Kumari

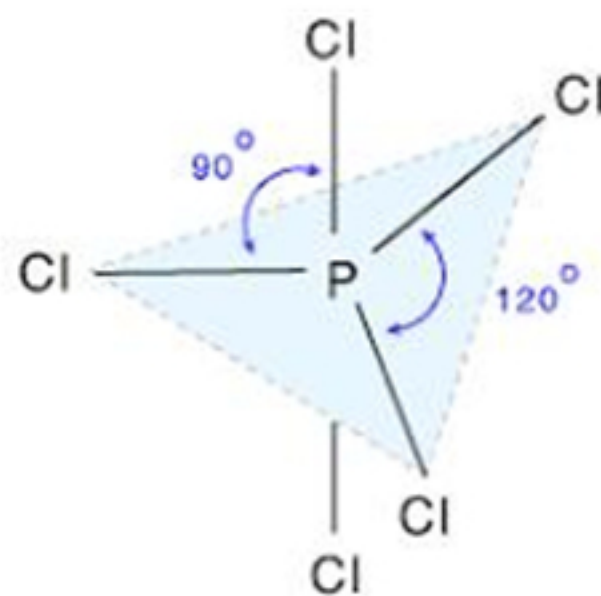
sp^3d hybridisation

- Mixing of one s , three p and one d orbitals to form five sp^3d hybrid orbitals.



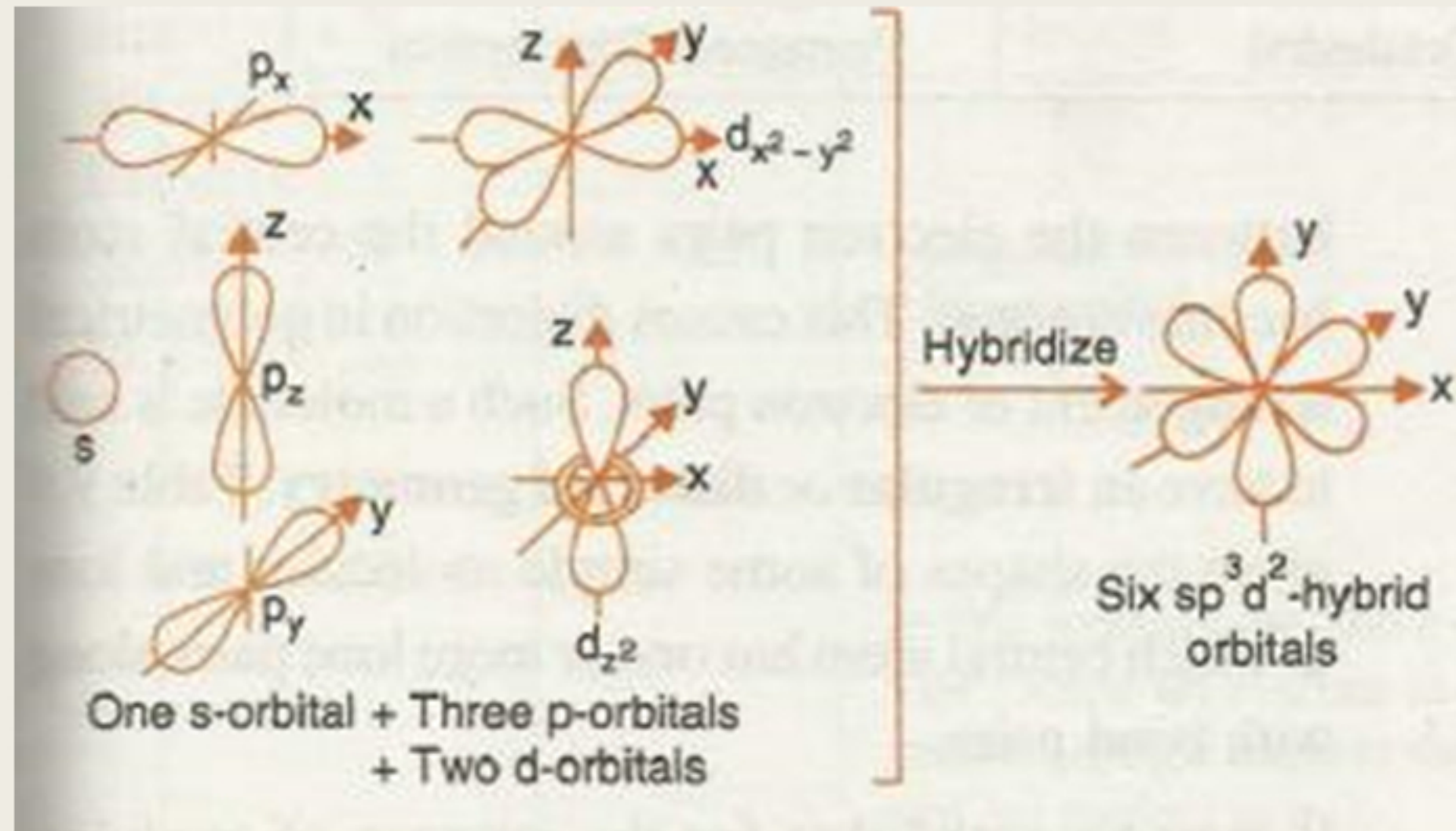
Formation of PCl_5

- It should be noted that all the bond angles in trigonal bipyramidal geometry are not equivalent.
- In PCl_5 the five sp^3d orbitals of phosphorus overlap with the singly occupied p orbitals of chlorine atoms to form five P–Cl sigma bonds.
- Three P–Cl bonds lie in one plane and make an angle of 120° with each other; these bonds are termed as equatorial bonds.
- The remaining two P–Cl bonds—one lying above and the other lying below the equatorial plane, make an angle of 90° with the plane. These bonds are called axial bonds.



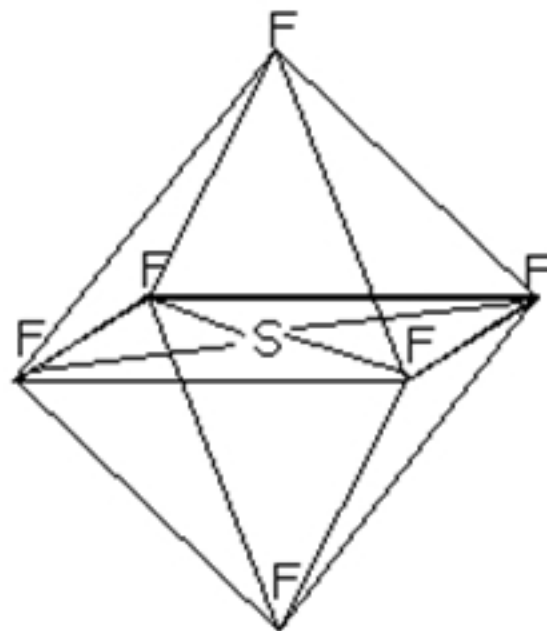
sp^3d^2 hybridisation

- one s , three p and two d orbitals undergo intermixing to form six identical sp^3d^2 hybrid orbitals.



Formation of SF₆

- In SF₆ the central sulphur atom has the ground state outer electronic configuration $3s^23p^4$.
- In the excited state the available six orbitals *i.e.*, one *s*, three *p* and two *d* are singly occupied by electrons.
- These orbitals hybridise to form six new sp^3d^2 hybrid orbitals, which are projected towards the six corners of a regular octahedron in SF₆.



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