Preparation of Xenon Tetra fluoride:-

① It is prepared by heating a mixture of Xenon and fluorine, in the molecular ratio of 1:5 through a nickel tube at 400°c under a pressure of 5–6 atm.

$$Xe + 2F_2 \longrightarrow XeF_4$$

② It is also synthesised by passing an electric discharge through a mixture of Xenon and fluorine in the molecular ratio 1:2 at −80°c

Properties:-

1. It is a colourless, crystalline solid which melts at 107°c. It sublimes readily.
2. It dissolves in hydroge fluoride without reacting.
3. It is reduced by hydrogen at 117°C as under:-

$$XeF_4 + 2H_2 \longrightarrow Xe + 4HF$$

4. It reacts with boron trichloride to form boron trifluoride.

$$3XeF_4 + 4BCl_3 \longrightarrow 4BF_3 + 3Xe + 6Cl$$

5. It undergoes disproportionation in water giving a highly explosive solid compoun XeO_3

$$2XeF_4 + 3H_2O \longrightarrow Xe(g) + \underset{\text{(explosive)}}{XeO_3(s)} + 6HF(aq) + F_2(g)$$

6. It forms an addition Compound with antimony Pentafluoride.

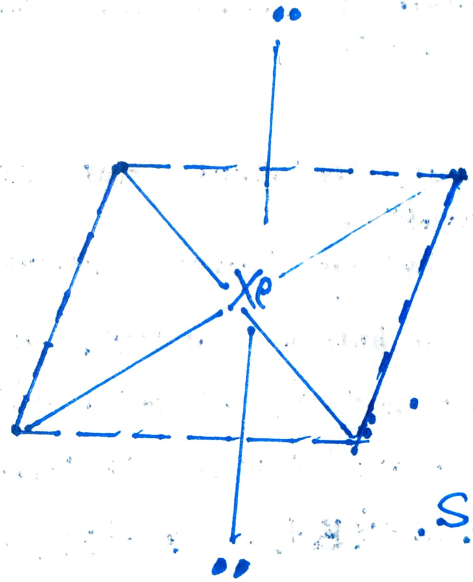
$$XeF_4 + SbF_5 \longrightarrow XeF_4 \cdot SbF_5 \rightarrow [XeF_3]^+[SbF_6]^-$$

Structure and shape of XeF_4 Molecule.

In XeF_4 molecule the four bonds are believed to be covalent, two of the 5p electrons goto the 5d orbitals so that there are now four unpaired electrons (two is 5p and two in 5d orbital) as shown in figure these are used in bonding with four atoms of fluorine.

This is evidently, a case of sp^3d^2 hybridisation which should be octahedral structure to the molecule But on account of the Presence of two lone pairs, the Geometry gets distorted and the molecule assumes a **Square Planar** structure.

The Xenon atom and the four fluorine atoms are Co-planar, while the two equatorial positions are occupied by the two lone pairs of electrons. As shown in figure given below.



Square Planar

Xenon Hexafluoride (XeF_6)

Preparation:-

1. Xenon hexafluoride is prepared by heating xenon with excess of fluorine in ration of 1:20, in a nickel vessel under a pressure of about 50 atm.

$$Xe + 3F_2 \longrightarrow XeF_6$$

2. Xenon hexa fluoride can also be obtained by interaction of XeF_4 and F_2 under pressure

$$XeF_4 + F_2 \longrightarrow XeF_6$$

3. It is also prepared by passing electric discharge through a mixture of xenon and fluorine in the ratio of 1:3, at low temperature.

Properties of Xenon Hexafluoride:-

1. Xenon hexa fluoride is a solid crystalline substance which melts at 46°c.
2. It is most volatile of all the fluorides of xenon. It's vapour have a greenish yellow colour.
3. It dissolves hydrogen fluoride giving a solution which is good conductor of electricity

This is substituted to the formation of ions as under

$$HF + XeF_6 \longrightarrow XeF_5^+ + HF_2^-$$

XeF_6 thus differ from XeF_2 and XeF_4 as it dissolve in hydrogen fluoride without reacting.

4. It is extremely reactive. It reacts with Quartz.

$$SiO_2 + 2XeF_6 \longrightarrow 2XeOF_4 + SiF_4$$

5. It reacts with hydrogen like other fluorides of xenon.

This; $XeF_6 + 3H_2 \longrightarrow Xe + 6HF$

6. It undergoes slow hydrolysis with atmospheric moisture producing highly explosive XeO_3

$$XeF_6 + 3HO \longrightarrow$$

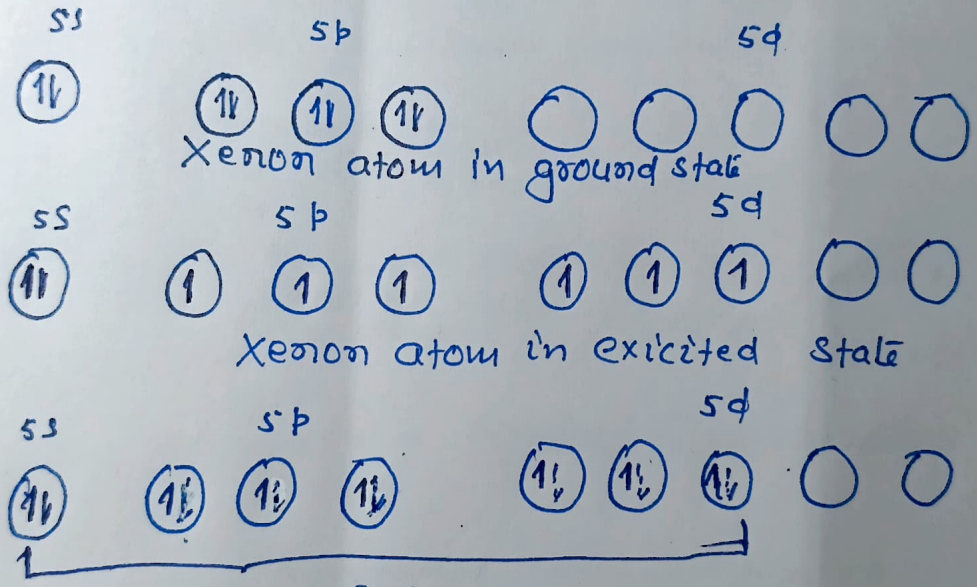
Structure and shape of XeF_6 Molecules

In XeF_6 molecule all the Six bonds in XeF_6 are covalent. Three of the 5p-electrons move into 5d-orbitals, so that Six unpaired electrons (i.e three in 5p-orbital & three in 5d-orbitals) become available for chemical bonding.

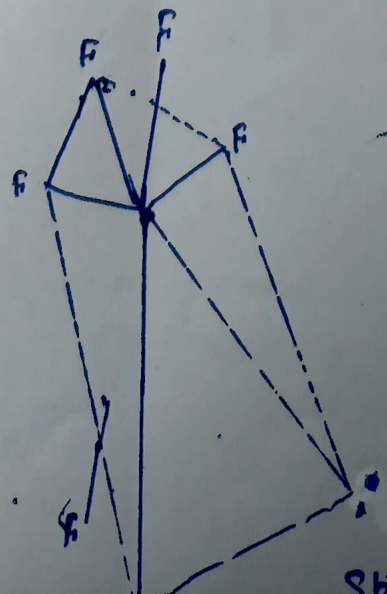
These are used in bonding with six atoms of fluorine as shown in fig.

This is evidently, a case of sp^3d^3 hybridisation which should give it a pentagonal bipyramidal structure, slightly distorted on account of the presence of a lone pair of electoons.

However this structure has not yet been confirmed



sp^3d^3 hybridisation.



sp^3d^3 hybrid