

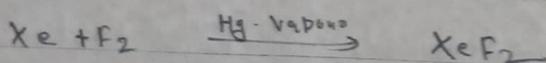
Oxidation State	Compounds of Xenon	
	Formula	Name
(A) (II)	XeF_2	Xenon difluoride
(B) (IV)	$XeF_4, XeOF_2$	Xenon tetrafluoride Xenon oxydifluoride
(C) (VI)	$XeF_6, XeOF_4, XeO_3$	Xenon hexafluoride Xenon oxytetrafluoride Xenon trioxide
(D) (VIII)	XeF_8, XeO_4	Xenon octafluoride Xenon tetraoxide

(A) Xenon II Compounds: \rightarrow

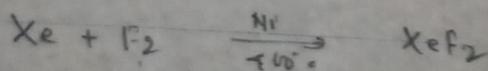
Xenon difluoride (XeF_2) \rightarrow

Preparation: \rightarrow

(i) It is prepared by photochemical combination of Xenon and Fluorine under the influence of mercury vapour.



(ii) XeF_2 can be prepared by heating Xenon and Fluorine in molecular ratio 1:5 in short nickel tube, on cooling quickly, a colourless solid, XeF_2 , results.



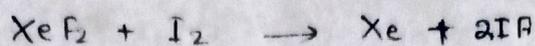
Prop 2 Xenon difluoride is colourless, crystalline solid having m.p. $163^\circ C$.

(2) It dissolves in liquid hydrogen fluoride without reaction with it.

(3) It reacts with hydrogen to give hydrogen fluoride and Xenon.



4) It oxidises I_2 in presence of BF_3 to yield IF_5 .

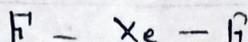


5) It is a mild fluorinating agent. It reacts with Benzene to yield Fluoro Benzene (C_6H_5F).

Structure and Shape of Xenon difluoride \rightarrow

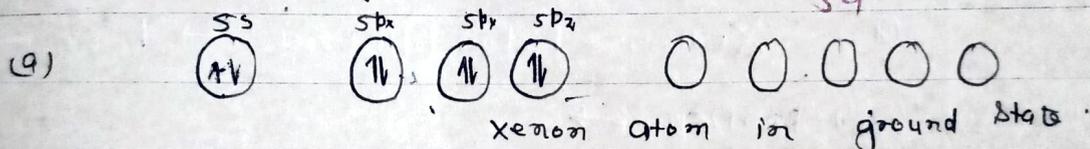
According to present view, XeF_2 is formed by covalent bonds.

viz,

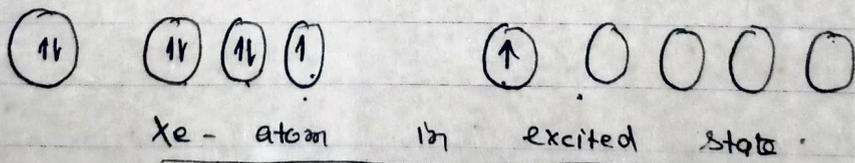


This is explained on the basis of orbital theory as follows:-

The outer electronic configuration of Xe-atom in ground state is



In excited state its one $5p_z$ electron moves to a vacant $5d$ -orbital giving two half-filled orbitals giving electronic configuration as shown below-



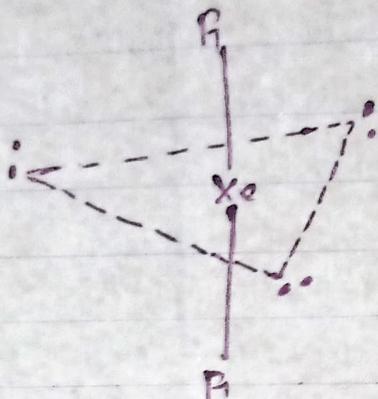
Now Xe-atom in excited state has two half-filled atomic orbitals. In the formation of Xenon

difluoride one $5s$ orbital, three $5p$ -orbitals and one $5d$ -orbital hybridize to give five sp^3d hybrid orbitals. Three of them are

occupied by lone pairs and two hybrid orbitals which are singly occupied overlap with two

F-atoms. Thus, central atom Xenon is surrounded by five orbitals.

three of them contains lone pair and two contains bond pairs. According to V.S.E.P.R. theory the shape of the molecule should be trigonal bipyramidal. But due to presence of 3 lone pairs the shape is linear.



Structure of XeF_2

Xenon (II) Compounds \rightarrow

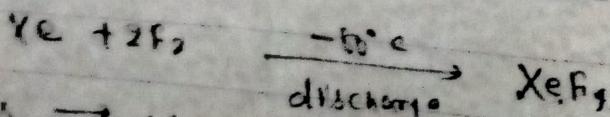
(1) Xenon - tetra fluoride $\rightarrow \text{XeF}_4 \rightarrow$

Preparation \rightarrow

(i) It is prepared by heating a mixture of Xenon and Fluorine in the molecular ratio 1:5 through a nickel tube, at 400°C under a pressure of 5-6 atm.

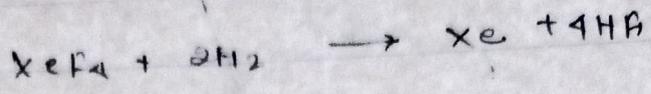


(ii) It is synthesised by passing an electric discharge through a mixture of Xenon and Fluorine in the molecular ratio 1:2 at -80°C .

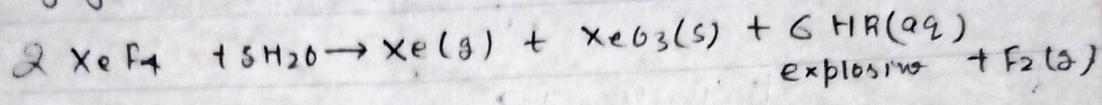


Properties \rightarrow (1) It is a colourless crystalline solid which melts at 107°C . It sublimes readily.
 (2) It dissolves in hydrogen fluoride without reacting.

(3) It is reduced by hydrogen at 117°C as under.

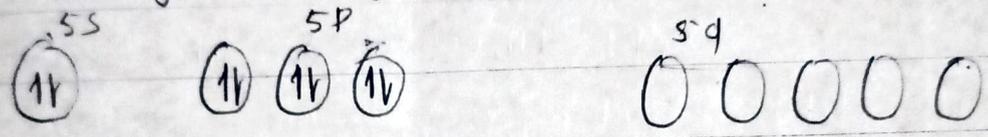


(4) It undergoes disproportionation in water giving a highly explosive solid XeO_3 .

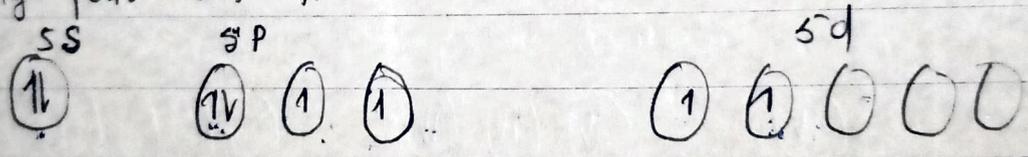


Structure and shape of $\text{XeF}_4 \rightarrow$ The outer

shell configuration of Xe-atom in ground state is



During the formation of XeF_4 two of the $5p$ -electrons go to $5d$ orbitals giving four half-filled orbitals.



Xe-atom in excited state.

Now one $5s$ -orbital, ~~one~~ ^{three} $5p$ -orbital and two $5d$ orbitals hybridises to give 6.

sp^3d^2 hybrid orbitals. Two of them occupied by lone pairs, four singly occupied hybrid orbitals overlap with four half-filled $2p_z$ -orbitals of four fluorine atoms. Now the central atom Xe in XeF_4 is surrounded by 6 orbitals. Two of them are occupied by lone pairs and four are occupied by bond pairs. According to V.S.E.P.R. Theory the shape of molecule should be octahedral. But due to presence of two lone pairs geometry is distorted and the molecule becomes square plane. as shown below