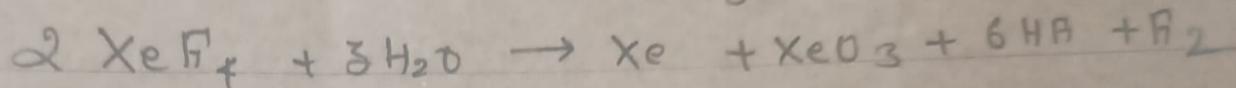
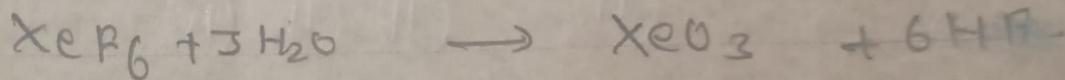


(d) XeO_3 (Xenon trioxide) \rightarrow

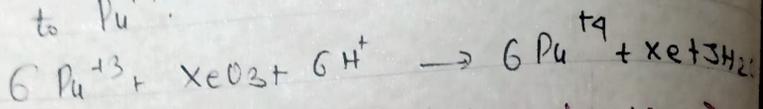
(i) Xenon trioxide is formed in small amounts when xenon tetrafluoride undergoes disproportionation. On hydrolysis with water.



Or when xenon hexafluoride reacts slowly with atmospheric moisture.



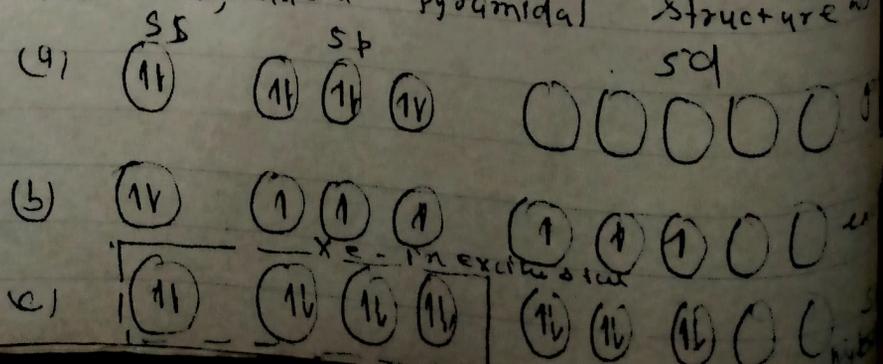
Properties: — Xenon trioxide is a white non volatile compound and is soluble in water. It is quite stable when present in aqueous solution. However it explodes violently when dry. It can be detonated by simple rubbing or pressing and produces about the same effect as T.N.T. This has created a lot of interest in the preparation of this compound. It is a powerful oxidising agent. It oxidised Pu^{+3} to Pu^{+4} .

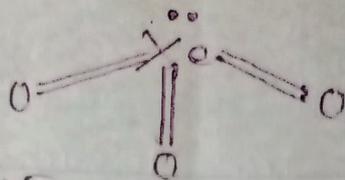


Structure and Shape of molecule →

The formation of XeO_3 molecule involves sp^3 hybridisation as represented in figure.

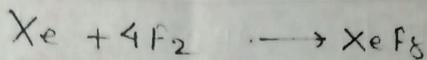
Three of the four hybrid orbitals which are singly filled form three σ -bonds with 3 oxygen atoms. The three $5d$ orbitals which are excluded from hybridisation, form 3 π bonds with the same three O-atoms. Thus, each O is bonded to Xenon by a double bond. One of the hybrid orbitals contains a lone pair of electrons. Consequently there is distortion in the molecule. As a result of this, the molecule, instead of being tetrahedral, has a pyramidal structure.





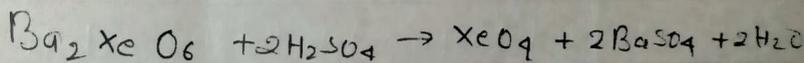
Xenon VIII Compounds \rightarrow

(1) Xenon Octa Fluoride \rightarrow XeF_8 \rightarrow This compound is believed to be formed, to small extent, by reacting Xenon with a large excess of Fluorine under high pressure.



The structure of this compound has not been established.

(2) Xenon tetra oxide, XeO_4 \rightarrow Xenon tetraoxide can be prepared from barium peroxide or treatment with anhydrous Sulphuric acid



It is not a stable as tetraoxide.

It decomposes to give Xenon and oxygen

(3) Xenon Oxyhexa Fluoride (XeOF_6) \rightarrow

This compound of Xe (VIII) is also known. It is formed by a small amount along with XeF_4 . When Xenon and Fluorine are heated together in air the oxygen comes from air. The properties of this compound are still under investigation.

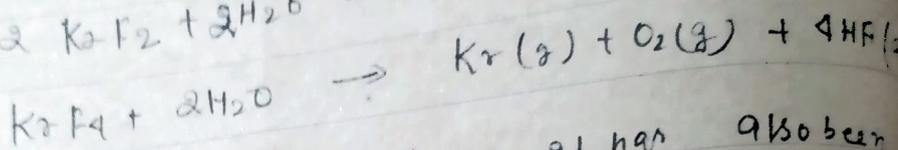
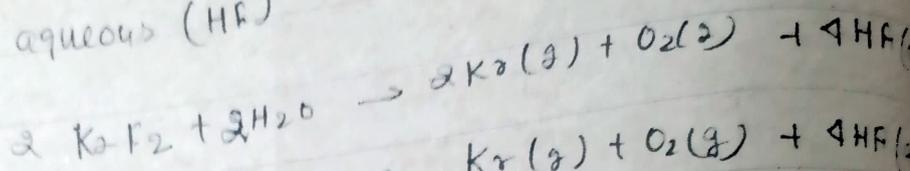
Fluorides of Kr. and Rn \rightarrow

Fluorides of Krypton: — Recent experiments have shown that Krypton can also combine with fluorine under suitable conditions yielding

Krypton difluoride (KrF_2) and (KrF_4)

KrF_2 is obtained by photochemical combination of Kr and Fluorine. KrF_4 is obtained by passing an electric discharge through a mixture

of Krypton and Fluorine at a temp. of 100°C .
 Corresponding to Xenon fluorides are much less stable
 and hydrolysed by water giving these are easily
 aqueous (HF)



Radon Fluoride (RnF_2) \rightarrow it has also been prepared by similar method but is highly unstable.

Only Compounds of Krypton $\rightarrow \text{KrO}_3 \cdot X\text{H}_2\text{O}$, it is obtained in very small quantities by the hydrolysis of Krypton tetrafluoride, KrF_4 , using ice at a temperature below -20°C . The value of X may be 1 or 2. Krypton trioxide acts as an oxidising agent.

As Compounds of He and Ne are possible.

Let us first examine the outer shell electronic configuration of these elements. On taking the case seriously we find that Xe, Kr and Rn, possess vacant d-orbitals in their valency shell which permit the formation of hybrid bonds. But in the case of He and Ne, there is no vacant d-orbitals. Hence after chemical combination electrons of outer shell will need to get promoted to next higher energy shell in case of He and Ne. It will also require a lot of energy and process will not be easily feasible.

The ionisation energy of Ar, Kr, Xe and Rn are lower than those of fluorine and oxygen. But ionisation energies of He and Ne are much more higher than the oxygen and fluorine. This also shows that compounds of oxygen and fluorine are possible with Kr, Ar, Xe and Rn, but not possible with oxygen and fluorine.

