

# COMPOUNDS OF XENON

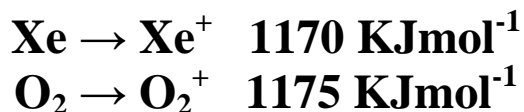
	<b>Gr. 18</b>
<b>Period</b> <b>5</b>	<b>Xe</b> Mass No. 131.29 Atomic No. 54 No. Of isotopes = 9

## Electronic configuration:



*It was 1933 LINUS PAULING , from a consideration of ionic radii, suggested that  $KrF_6$  &  $XeF_6$  should be prepared.*

While investigating the chemistry of  $PtF_6$  N BARTLETT noticed that its accidental exposure to air produce a change in colour, and with D H LOHMANN he later showed this to be  $O_2^+[PtF_6]$ . BARTLETT also noted that first ionisation energy of xenon is comparable to that of molecular oxygen.



He quickly proceeded to show that deep-red  $PtF_6$  vapour spontaneously oxidised Xe to produce an orange-yellow solid  $XePtF_6$ .

Oxidation state of xenon in its compounds ranges from +2 - +8.

## COMPOUNDS OF XENON

Coordination number	Stereochemistry	Example	Structure
<b>2</b>	<b>Linear</b>	<b>XeF<sub>2</sub></b> Colourless crystals	DRAW YOURSELF,CONSULT BOOK
<b>3</b>	<b>Pyramidal</b>	<b>XeO<sub>3</sub></b> Colourless crystals	DRAW YOURSELF,CONSULT BOOK
<b>4</b>	<b>Tetrahedral</b>	<b>XeO<sub>4</sub></b> Explosive, colourless gas.	DRAW YOURSELF,CONSULT BOOK
<b>4</b>	<b>Square-planer</b>	<b>XeF<sub>4</sub></b> Colourless crystals	DRAW YOURSELF,CONSULT BOOK
<b>4</b>	<b>See-saw</b>	<b>XeO<sub>2</sub>F<sub>2</sub></b>	DRAW YOURSELF,CONSULT BOOK
<b>5</b>	<b>TBP</b>	<b>XeO<sub>3</sub>F<sub>2</sub></b>	DRAW YOURSELF,CONSULT BOOK
<b>6</b>	<b>Distorted octahedral or capped octahedral</b>	<b>XeF<sub>6</sub></b> Colourless crystals	DRAW YOURSELF,CONSULT BOOK
<b>8</b>	<b>Square anti-prismatic</b>	<b>XeF<sub>8</sub><sup>2-</sup></b>	DRAW YOURSELF,CONSULT BOOK

### **XENON DIFLUORIDE:**

#### **PREPARATIONS:**

1.  $\text{Xe} + \text{F}_2 \xrightarrow{\text{light from a mercury lamp}} \text{XeF}_2$
2.  $\text{Xe (excess)} + \text{F}_2 [\text{Xe} : \text{F}_2 = 2:1] \xrightarrow{\text{sealed Ni tube, } 400^\circ\text{C}} \text{XeF}_2$
3.  $\text{Xe} + \text{O}_2\text{F}_2 \xrightarrow{-118^\circ\text{C}} \text{XeF}_2 + \text{O}_2$

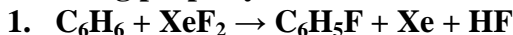
#### **HYDROLYSIS:**

1.  $2\text{XeF}_2 + 2\text{H}_2\text{O} = 2\text{Xe} + 4\text{HF} + \text{O}_2$   
Hydrolysis is slow in dilute acid medium and rapid in basic medium.
2.  $\text{XeF}_2 + 2\text{OH}^- = \text{Xe} + \frac{1}{2}\text{O}_2 + 2\text{F}^- + \text{H}_2\text{O}$

#### **REDOX PROPERTY:**



**Fluorinating property:**



XeF<sub>2</sub> is a strong oxidant & can oxidise Cl<sup>-</sup> to Cl<sub>2</sub>, Ce<sup>3+</sup> to Ce<sup>4+</sup>, NH<sub>3</sub> to N<sub>2</sub> etc. XeF<sub>2</sub> can also behave as Lewis base towards SbF<sub>5</sub>, IF<sub>5</sub> etc. to produce XeF<sub>2</sub>·2SbF<sub>5</sub> & XeF<sub>2</sub>·IF<sub>5</sub>

### **XENON TETRAFLUORIDE:**

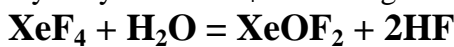
**PREPARATIONS:**



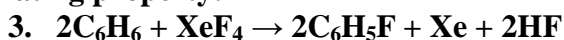
**HYDROLYSIS:**



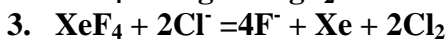
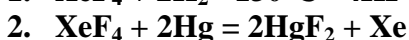
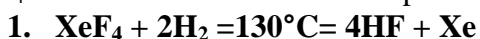
Hydrolysis of XeF<sub>4</sub> at -80°C gives xenon oxydifluoride, XeOF<sub>2</sub>



**Fluorinating property:**

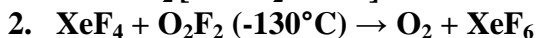


XeF<sub>4</sub> can oxidise a number of compounds & itself is reduced to Xe.

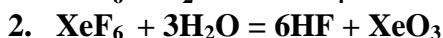
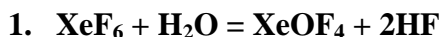


### **XENON HEXAFLUORIDE: (XeF<sub>6</sub>)**

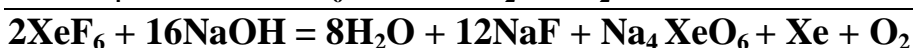
**PREPARATIONS:**



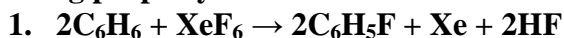
**HYDROLYSIS:**



In strongly basic solution [2.5 M NaOH] XeF<sub>6</sub> is converted in xenate ion, HXeO<sub>4</sub><sup>-</sup> which slowly disproportionates in to perxenate ion, XeO<sub>6</sub><sup>4-</sup> and Xe.

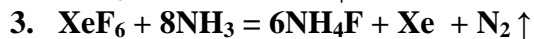
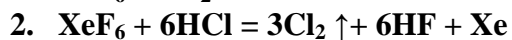


**Fluorinating property:** Out of three xenon fluorides XeF<sub>6</sub> is best fluorinating agent.



**OXIDISING PROPERTY:**

XeF<sub>6</sub> can oxidise a number of compounds & itself is reduced to Xe.



**REACTION WITH SILICA:** Xenon hexafluoride reacts with silica to produce colourless silicon tetrafluoride gas and solid xenon trioxide.

