

Group 18 - Noble gas

occurrence

- All the noble gas occur in the atmosphere except radon
- Dry air $\approx 1\%$ by volume where argon is the major constituent.
- He & Ne are found in mineral of radioactive origin
- Source of He $\rightarrow$ Natural gas
- Xe, Rn are rarest elements
- Radon is obtained as a decay product of ^{226}Ra

Electronic Configuration

$ns^2 np^6$ except He ($1s^2$)

Atomic radii

increases down the group

Ionisation Enthalpy

Decreases down the group

Electron gain Enthalpy

- No tendency to accept e^- . Hence very high +ve value

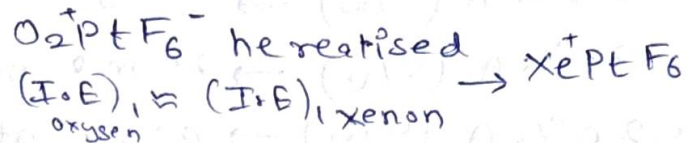
Properties

- All are monoatomic
- Colourless, odourless, Tasteless
- **Very low** M.P & B.P because the only type of interatomic interaction is the weak dispersion forces.
- He has the lowest B.P in the world (diffusing property)

Chemical Property

They are inert because

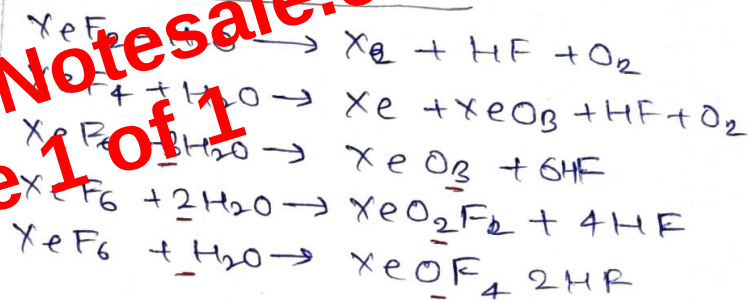
- a) Completely filled electronic configuration
- b) High I.E and ΔH_{eg} (large +ve)



a) Xe-F compound

- $\text{Xe} + \text{F}_2 \rightarrow \text{XeF}_2$
- $\text{Xe} + 2\text{F}_2 \rightarrow \text{XeF}_4$
(1:5 ratio)
- $\text{Xe} + 3\text{F}_2 \rightarrow \text{XeF}_6$
(1:20 ratio)
- $\text{XeF}_4 + \text{O}_2\text{F}_2 \rightarrow \text{XeF}_6 + \text{O}_2$
 $\rightarrow$ Colourless crystalline solids
 $\rightarrow$ Powerful Fluorinating agent
 $\rightarrow$ Readily Hydrolysed even by trace H_2O
 $\text{XeF}_2 + \text{H}_2\text{O} \rightarrow \text{Xe} + \text{HF} + \text{O}_2$
 $\text{XeF}_2 + \text{PF}_5 \rightarrow [\text{XeF}]^+ [\text{PF}_6]^-$
 $\text{XeF}_4 + \text{SbF}_5 \rightarrow [\text{XeF}_3]^+ [\text{SbF}_6]^-$
 $\text{XeF}_6 + \text{MF} \rightarrow [\text{M}]^+ [\text{XeF}_7]^-$

b) Xe-O compound



XeO_3 : Colourless, explosive solid
 XeOF_4 : colourless volatile liquid

Shape

- a) $\text{XeF}_2 \rightarrow$ Linear
- b) $\text{XeF}_4 \rightarrow$ Square planar
- c) $\text{XeF}_6 \rightarrow$ Distorted tetrahedral
- d) $\text{XeOF}_4 \rightarrow$ Square pyramidal
- e) $\text{XeO}_3 \rightarrow$ pyramidal