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Inter Halogen

ICl ClF_3 BrF_5 IF_7

Compound which are formed by two type of Halogens

XX' XX'_3

→ they are covalent Compound

— they are polar Covalent

$\overset{+\delta}{I}-\overset{-\delta}{Cl}$

Polar

they Have Higher M.P and B.P than the corrosponding Halogen

— they are more reactive than the Halogen except F_2

Hydrolysis

$$I\text{-}Cl + H\text{-}OH \longrightarrow HOI + HCl$$

$$XX' + H\text{-}OH \longrightarrow HX + HOX'$$

Select the correct statement about X and X'

(1) X is more E.N than X'

(2) X' is more E.N than X

(3) X has higher size than X'

(4) X' has higher size than X

(1) they are covalent and diamag.

(2) they are volatile solid and liq at 298 K except ClF which is gas.

Pseudo Halogen

They are univalent ion consisting of two or more atoms of which one is N

$\bar{C}N$ $N\bar{C}S$ $S\bar{C}N$

Ex. Which of the following is not Pseudo Halogen

(1) $\bar{O}CN$ (2) $N\bar{C}$ (3) $RCOO^-$ (4) all are Pseudo Halogen

Cl^- / Br^- / I^-	CN^-
NaCl (sol.)	NaCN (sol.)
AgCl (ppt.)	AgCN (ppt.)
$[CuCl_4]^{-3}$	$[Cu(CN)_4]^{-3}$
Cl_2	$(CN)_2$

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18th group:

(1) All the Noble gas except Rn occurs in atomspher

(2) reletive abundance ⇒ Ar %.

(3) He and sometime Ne are found in 'minreals of radioactive origan example pitch blend and monazite

(4) Commerical source of He natural gas

(5) Xe and Rn are rarest element

118 Og

e^- conf. $= ns^2 np^6$

Atomic size ↑ down the group

He < Ne < Ar < Kr < Xe

I.E ↓ down the group

He > Ne > Ar > Kr > Xe

ΔH_{eg} ⇒ +ive

☆ Ne = +116 — highest in Noble gas

B.P / M.P ⇒ ↑ down the group

He < Ne < Ar < Kr < Xe

(M.P = -269°C) because of L.D.f

D = ↑

He < Ne < Ar < Kr < Xe

Physical prop

1. They are monoatomic gas
2. Colourless odourless tasteless
3. sparing soluble in water due dipole – Induced dipole Interaction

Solubility order

He < Ne < Ar < Kr < Xe

4. He has lowest B.P (4.2 K)

Chemical prop.

less reactive

due to (i) fully filled conf.

(ii) High I.E

(iii) +ive ΔH_{eg}

Bartlett (1962

$$O_2 + [P + F_6] \longrightarrow O_2[P + F_6]$$

$O_2 \approx Xe$

I.E = 1175 1170 KJ/mole

$$Xe + [P + F_6] \longrightarrow \overset{+}{Xe}[\overset{V}{P} + F_6]^{\ominus}$$

first discovered compound of Noble gas

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Compounds

$$Xe + F_2 \longrightarrow XeF_2$$

(excess)

$$Xe + F_2 \longrightarrow XeF_4$$

1 : 5

$$Xe + F_2 \longrightarrow XeF_6$$

1 : 20

$$XeF_4 + O_2F_2 \longrightarrow XeF_6 + O_2$$

Prop XeF_2 XeF_4 XeF_6 are colourless crystalline solid and they sublime at 298K

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Hydrolysis

$Xe(OH)_2$ doesnot exist

$\downarrow$

$XeO + 2H_2O$

$\downarrow$

$Xe + \frac{1}{2}O_2$

$Xe(OH)_4 \longrightarrow XeO_2$

$\downarrow$

$Xe + XeO_3 + O_2$

$$\overset{+2}{Xe}F_2 + \overset{+}{H}\text{-}\overset{-}{O}H \longrightarrow Xe + \overset{0}{O_2} + HF$$

Redox

$$XeF_4 + H\text{-}OH \longrightarrow Xe + XeO_3 + O_2 + HF$$

Step wise Hydrolysis

$$XeF_6 + H_2O \longrightarrow XeOF_4 + 2HF$$

$$XeOF_4 + H_2O \longrightarrow XeO_2F_2 + 2HF$$

$$XeO_2F_2 + H_2O \longrightarrow XeO_3 + 2HF$$

$$XeF_6 + 3H_2O \longrightarrow XeO_3 + 6HF$$

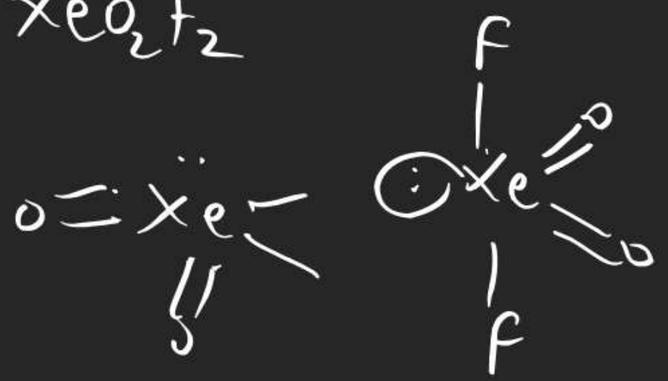
XeF_6 Hydrolysis in basic medium

$$XeF_6 + NaOH \longrightarrow XeO_3 + HF$$

XeO_3 $\xrightarrow{OH^-}$ $HXeO_4^-$ (Xenate ion) unstable

$HXeO_4^-$ → (Perxenate ion) $XeO_6^{-4} + Xe + O_2$

XeO_2F_2



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Flourinating agent

$$SF_4 + XeF_2 \longrightarrow SF_6 + Xe$$

$$Pt + XeF_4 \longrightarrow PtF_4 + Xe$$

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Fluoride donor

M = Sb | As

$$XeF_2 + MF \longrightarrow [Xe^+][MF_2]^-$$

$$XeF_6 + BF_3 \longrightarrow [XeF_5]^+[BF_4]^-$$

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

✡ Reaction SiO_2

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

✡ $$XeO_3 + XeOF_4 \longrightarrow XeO_2F_2$$

$$XeO_3 + XeF_6 \longrightarrow XeOF_4$$

Oxidising prop:

$$XeF_2 + H_2 \longrightarrow Xe + HF$$

$$XeF_2 + HCl \longrightarrow Xe + HF + Cl_2$$

$$XeF_4 + KI \longrightarrow Xe + I_2 + KF$$

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Fluoride acceptor

$$MF + XeF_6 \longrightarrow M^{+}[XeF_7]^{-} \quad (M = Na|K|Pb|Cs)$$

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$$^{226}_{88}Ra \xrightarrow{-\alpha} {}^{222}_{86}Rn + 2\,He^{4}$$

He exist in two form { I, II

I He and II He convert in each other at 1 point