Date 10/07/19

CH- P- BLOCK ELEMENTS

[16- Group Elements] [oxygen family] [8MM]

* following Elements are present → O, S, Se, Te, Po.
* These are also called chalcogens (ore Producers)

O } Non-metal.
S }

Se } Metalloid.
Te }

Po } metal (Radioactive)

Occurence :- * Oxygen is 46.6% by mass in earth Crust.
* Sulphur is present in the form of Sulphates. eg:- $BaSO_4$ → Bargte
$CaSO_4 \cdot 2H_2O$ → Gypsus
$MgSO_4 \cdot 7H_2O$ → Epsum
ZnS → zinc Blende
PbS → Galena.

✓ Organic material such as egg, protein, Gallic, onion, Mustard, Hair, wool also contains sulphur.

- Po occurs in nature and is a decay product of thorium

- General Electronic configuration :- ns^2np^4
- Atomic and Ionic radii. Down the group increases.
- Ionization enthalpy :- Down the group

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decreases because size increases

Q Why ~~electron~~ Ionization enthalpy of nitrogen is greater than oxygen.

Ans Nitrogen has higher ionization enthalpy than oxygen due to half filled P-Sub Shell.

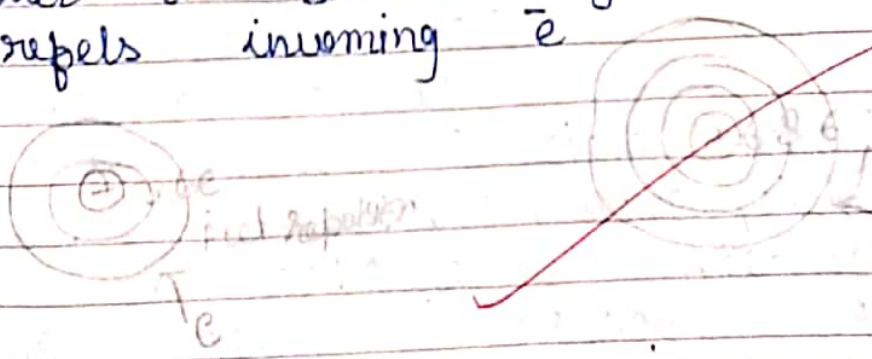
V.V. Imp.

E.G.P (Electron Gain Enthalpy): decreases down the group.

They have high -ve e.g.P i.e $\Delta H = -ve$

Q Oxygen has lower e.g.p than sulphure. Give Reason.

Ans Oxygen has less negative e.g.P than Sulphur due to small size of O atom so that its $\bar{e}$ cloud is distributed over a small region and therefore repels incoming $\bar{e}$



- Melting point and b.p increases down the group due to increase in size.

Ans

M.P / B.P $\propto$ No. of $\bar{e}$
No. of $\bar{e}$ $\propto$ Vanderwaal force
Vanderwal force $\propto$ Size

$\overset{+2}{O}F_2$	$\overset{+1}{O_2}F_2$

These is a large diff. between the melting point and boiling point of oxygen and Sulphur this is due to atomicity.

i.e Oxygen is diatomic (O_2 gas)
Sulphur is polyatom (S_8 solid)

Chemical properties.

- They show −2, +2, +4, +6 oxidation state.
- Oxygen doesn't show +6 oxidation state due to absence of d-orbital
- Po does not show +6 ox. st. due to inert pair effect.
- The stability of −2 ox state decreases down the group due to increase in atomic size.
- The stability of +6 ox. state decreases and +4 increases down the group due to inert pair effect.

Inert pair Effect:

ns^{2} inert, np^{4} participate in bond formation

The decrease in oxidation no. by 2 unit is called Inert pair effect.

{Se, Te, Po} shows Inert pair effect

Anamalous Behaviour of oxygen:→

This is due to.

(i) Small size
(ii) High Electronegativity
(iii) absence of d-orbital
(iv) Hydrogen bonding in water which is not found in H_2S.

Q. H_2O is liquid and H_2S is gas / NH_3
Ans Due to hydrogen bonding in H_2O.

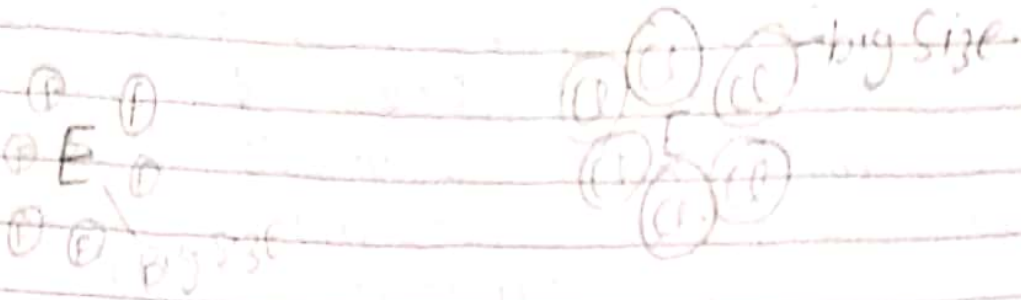
- Covalency of oxygen is restricted i.e it is two due to absence of d-orbital.

2. Reactivity towards halogen: They form EX_2, EX_4 & EX_6 type of halide.
$X = F, Cl, Br, I$.
$E = O, S, Se, Te$.
The stability of halide ion decreases down the group i.e
$F^- > Cl^- > Br^- > I^-$
This is due to E - X bond length increases down the group which require less energy for bond breaking

E — F
E — Cl
E — Br
E — I

Hexa Fluorides are only stable compound (EF_6) due to steric reason

i.e small size of F atom can accommodate (fit) in the other atom.



- EF_6 are gaseous and have sp^3d^2 hybridisation with octahedral struc.
- dihalides are sp^3 hybridised with tetrahedral structure.
- Monohalides are found in dimeric form eg:- S_2F_2, S_2Cl_2 S_2Br_2 etc.

Reactivity towards Hydrogen: All form H_2E type of hydride Eg:- H_2O, H_2S H_2Te etc.

Acidic character increases from top to bottom i.e $H_2O < H_2S < H_2Se < H_2Te$.

- This is due to bond dissociation enthalpy of H – E bond decreases down the group.
- Thermal stability decreases down the group.

i.e $H_2O > H_2S > H_2Se > H_2Te$.

- Reducing character increases down the group i.e $H_2O < H_2S < H_2Se < H_2Te$.
- This is due to above reason.

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Reactivity with oxygen: All form EO_2 and EO_3 type of oxide.

O_3 and SO_2 are gases while SeO_2 is a solid. This is due to SeO_2 found in polymeric form $(SeO)_n$

SO_2 is reducing agent while TeO_2 is oxidising agent. This is due to

$$\overset{+4}{S}O_2 \xrightarrow{[O]} \overset{+6}{S}O_3$$

$$\overset{+4}{Te}O_2 \longrightarrow \overset{+6}{Te}O_3 - \times \text{ unstable due to I.P.L}$$

$$\longrightarrow \overset{+2}{Te}O$$

Stable

Both type of oxide are acidic in nature.

Dioxygen (O_2)

Preparation.

$$2KClO_3 \xrightarrow{\Delta} 2KCl + 3O_2$$

$$2Pb_3O_4 \xrightarrow{\Delta} 6PbO + O_2$$

(Red lead) (litharg)

$$2PbO_2 \xrightarrow{\Delta} 2PbO + O_2$$

Oxides

The compounds of oxygen and other elements are called oxide.

SO_2 is acidic in nature because it form acid with water.

$$SO_2 + H_2O \rightarrow H_2SO_3$$

Sulphurus Acid.

SO_3 is also acidic in nature because it

ABMO - Anti Bonding molecular orbital

form acid with water

$$SO_3 + H_2O \rightarrow H_2SO_4$$

Properties.

V.Imp

O_2 molecule is paramagnetic due to two unpaired electron present in π^* (ABMO)

- Its rxn is highly exothermic.

Catalytic oxidation of compounds. ~~$2SO_2 + O_2$~~

$$2SO_2 + O_2 \xrightarrow{V_2O_5} SO_3$$

$$4HCl + O_2 \xrightarrow{CuCl_2} 2Cl_2 + 2H_2O$$

Uses.

In oxi-acetylene weilding & in the manufacture of many many metal like steel

- In the combustion of fuel.

OZONE (O_3)

Preparation: It is formed from atmospheric oxygen in the presence of oxygen at a height 20km. This ozone layer protect earth from U.V radiations.

Properties.

(i) Its smell causes headache and nausea

- It is a powerful oxidising agent due to Nacent oxygen

$$O_3 \longrightarrow O_2 + [O] \text{ Naccent oxygen.}$$

$$PbS + 4O_3 \longrightarrow PbSO_4 + 4O_2$$

$$2I^- + O_3 + H_2O \longrightarrow 2OH^- + I_2 + O_2$$

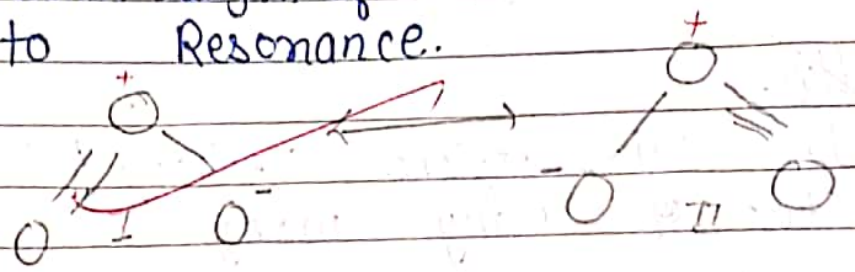
Note:- The oxide of nitrogen combine very

rapidly with ozone and therefore the possibility that N_2O oxide emitted from the exhaust system of supersonic jet aeroplane can be slowly depete [decompose] the ozone layer.

$$NO + O_3 \longrightarrow NO_2 + O_2$$

- Holes in ozone layer is due to freon gas (CFCs) which is obtained from aerosol sprays and refrigerators.

Structure:- The bond length of O-O bonds are identical due to Resonance.



Uses:-

- Used as germicide, disinfectant and for ~~stabilizing~~ sterilising water.
- Used for bleaching oils, ivory, flour, starch etc.

Allotropic form of sulphur. These are.

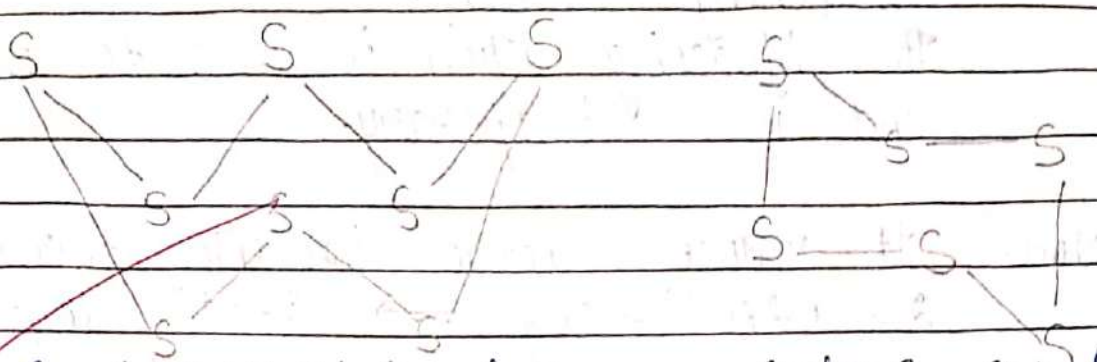
- Yellow Rhombic ~~circle~~ sulphur (α-sulphur)
- monoclinic sulphur (β-sulphur)
- At room temperature Rhombic sulphur is most stable.
- Rhombic sulphur $\xrightarrow{369°K}$ monoclinic sulphur.

(i) Rhombic sulphur (α-sulphur):- It is yellow colored

- Its crystal are formed on evaporating the ~~s-oxetion~~ sol^n of sulphur-roll in CS_2.
- Insoluble in water but soluble in CS_2

Monoclinic Sulphur:- It is soluble in CS_2

- Above 369°K β form is stable.
- And below 369°K α form is stable
- At 369°K both forms are stable.
- Both have S_8 molecule which are packed to give different crystal structure.



S_8 (α-Sulphur) Crown form Cyclo S_6 Chair form.

At elevated temperature (~1000°K) S_2 molecule is dominant and it is paramagnetic due to presence of 2 unpaired $\bar{e}$ in π^* (ABMO).

15-7-19

Sulpur dioxide

Preparation.

$$SO_3^{--} + 2\overset{+}{H} \longrightarrow H_2O + SO_2$$

$$4FeS_2 + 11O_2 \longrightarrow 2Fe_2O_3 + 8SO_2$$

Properties.

- It is colourless gas with pungent odour and highly soluble in water.
- When passed through water form acidic solution

$$SO_2 + H_2O \rightarrow H_2SO_3$$

Reaction with Cl_2:-

$Mn^{+7}O_4^-$ | Mn^{+2}

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$$SO_2 + Cl_2 \longrightarrow SO_2Cl_2$$
Sulphuryl Chloride.

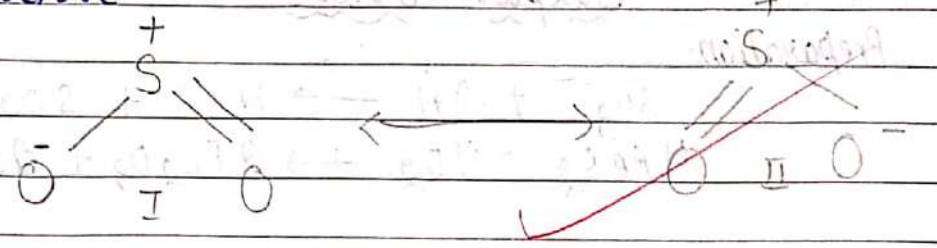
$$SO_2 + O_2 \xrightarrow{V_2O_5} SO_3$$

Note: Moist SO_2 behaves as a reducing agent (Bleaching action).
Its bleaching action is due to reduction and is temporary.

Note: It reduce ferric ion into ferrous ion.
$$2H_2O + 2Fe^{+3} + SO_2 \longrightarrow 2Fe^{+2} + SO_4^{--} + 4H^+$$

<u>Reduction of Magnate ion to Magnes ion.</u>
It decolourise $KMnO_4$ soln
$$5SO_2 + \underset{\text{Magnate ion.}}{2MnO_4^-} + 2H_2O \longrightarrow 5SO_4^{--} + 4H^+ + \underset{\text{Magnus ion.}}{2Mn^{++}}$$

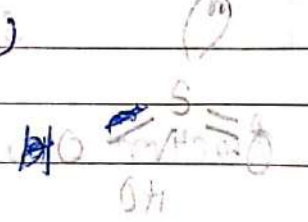
Structure.



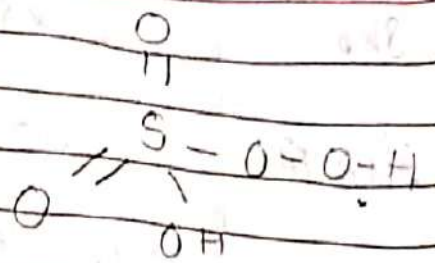
due to resonance the bond length between two S–O bonds are identical.

2020. Oxoacids of sulphur: Sulphur form number of oxoacids. These are.

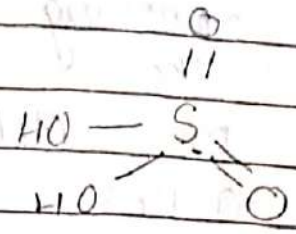
① Sulphurous Acid (H_2SO_3)



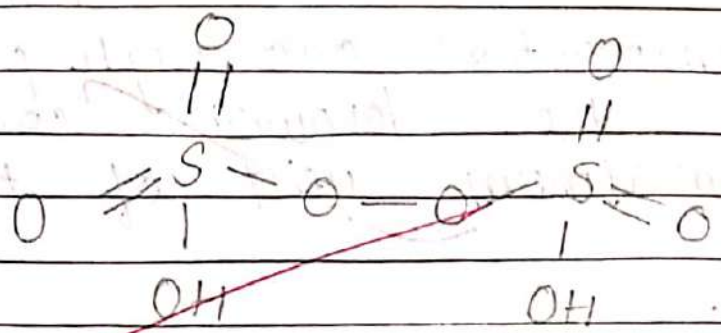
② Caro's Acid (H_2SO_5)



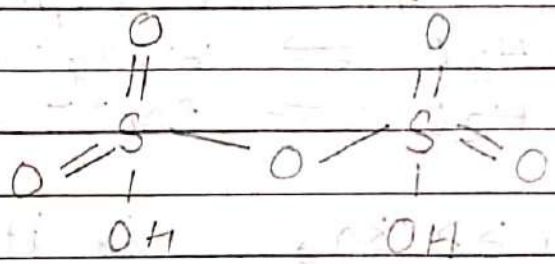
③ Sulphuric Acid (H_2SO_4)



④ Peroxodi Sulphuric Acid ($H_2S_2O_8$)



⑤ Pyrosulphuric acid or Oleum ($H_2S_2O_7$)



Sulphuric Acid (H_2SO_4)

Preparation It is prepared by contact process (commercial process).

Process occurs in three steps.

Step 1 $S + O_2 \longrightarrow SO_2$

OR

$4FeS_2 + 11O_2 \longrightarrow 2Fe_2O_3 + 8SO_2$

Step II $2SO_2 + O_2 \xrightarrow{V_2O_5} 2SO_3 + Heat.$

Step III $SO_3 + H_2SO_4 \rightarrow H_2S_2O_7$
Oleum

The SO_2 produced is purified by removing dust and other impurities like As_2O_3.
On dilution of Oleum with water gives H_2SO_4

$$H_2S_2O_7 + H_2O \rightarrow 2H_2SO_4$$
98%

~~High~~ low temperature and high pressure is the favourable condition for maximum yeild of H_2SO_4.

Properties.

- It is a dichrotic or dibasic acid.
It dissociate into two steps

$$H_2SO_4 + H_2O \rightleftharpoons HSO_4^- + H_3O^+, Ka_1$$
$$HSO_4^- + H_2O \rightleftharpoons SO_4^{--} + H_3O^+, Ka_2$$

Therefore $Ka_1 >> Ka_2$ so it dissociate into H^+ and HSO_4^- ion

- Conc. H_2SO_4 is a strong dehydrating agent.

$$C_{12}H_{22}O_{11} \xrightarrow[H_2SO_4]{Conc.} 12C + 11H_2O$$

- Hot Conc. H_2SO_4 is a moderately strong oxidising agent.

$$Cu + 2H_2SO_4(conc) \longrightarrow CuSO_4 + SO_2 + 2H_2O$$

$$S + 2H_2SO_4 \rightarrow 3SO_2 + 2H_2O$$

Uses.

The bulk of H_2SO_4 produced is used in th manufacture of fertilizer. It is a ver important industrial chemical.

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GROUP-17 ELEMENTS.
(Halogen family)

This group is also known as chalohalides (salt producer).
following elements are present.

$\underbrace{F, Cl, Br, I}_{\text{Non-metal}}, \underbrace{At}_{\text{Radioactive}}$

- They are highly reactive non-metal.

Occurance.
found in the form of ores eg CaF_2, Na_3 (cryolite).

- Seawater contains Na, K, Mg, Ca salts of chloride, Bromide & Iodide.
- sea weeds contain I_2 (0.5%) and chile salt Petre ($NaNO_3$) contains 0.2% sodium Iodate ($NaIO_3$)

Trends in properties

- General Electronic configuration:- ns^2np^5
- Atomic and ionic radii:- Halogens have the smallest atomic radii in periods due to maximum effective nuclear charge
- Ionization Enthalpy:- They have very high

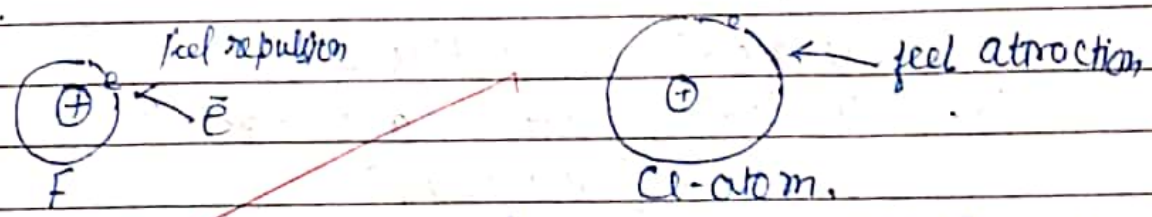
I.P due to small size than the other.

V.V.IMP Electron gain enthalpy :- Halogens have maximum negative electron gain enthalpy in the corresponding period. This is due to they have only one electron less than inert pair configuration.

- Electron gain enthalpy becomes less negative (decrease) down the group because atomic size increase
- The order E.G.P of Halogen.

$Cl > F > Br > I$

Q. Why E.G.P of Florine in less than Chlorine
Ans This is due to small size of F atom as a result there is strong interelectronic repulsion of small 2p orbital of F atom. Thus incoming $\bar{e}$ doesn't experiance much attraction force.



- Electronegativity :- They have high electronegativity. down the group electronegativity decreases. F is the most electronegative element in P.T.

Physical Properties.

- F_2, Cl_2 are gases. Br_2 is liquid I_2 is solid

V.V.Imp

Bond dissociation enthalpy:- Bond dissociation enthalpy decreases down the group.
Order:- $Cl_2 > Br_2 > F_2 > I_2$
Bond dissociation enthalpy of Cl_2 is more than F_2, this is due to large interelectronic repulsion of lone pair on small size of F_2.

Colour :- All Halogens are coloured because of absorbtion of radiation in visible region. As a result excitation of outer electron to higher energy level and radiate complementary colour after cooling i.e p- p transition.

Oxidising power:- All halogens have strong oxidising power because they have tendency to accept 1 e
Order:- $F_2 > Cl_2 > Br_2 > I_2$

Chemical properties:-
(i) Oxidation state and trends in chemical ~~properties~~ [Reactivity]
- All halogen shows -1 oxidation state
- Oxidation state of F = -1 (Constant)
- Oxidation state of Br, Cl, I = -1 to +7
  X = Cl, Br, I

X in ground state = $ns^2 np^5 nd$

	s	p			d				
	↑↓	↑↓	↑↓	↑					

E ↑ oxi. state = −1, +1

Ist oxi. state.

	↑↓	↑↓	↑	↑	↑				

E ↑ Oxidation state = +3

IInd excited

	↑↓	↑↓	↑	↑	↑	↑			

E ↑ oxi. state = +5

IIIrd excited state

	↑	↑	↑	↑	↑	↑	↑		

oxi. state = +7

$\boxed{X = \pm 1, +3, +7}$

Order of Boiling Point:- HF > HI > HBr > HCl

↳ Due to H-bonding

B.P ∝ no. of e ∝ vand. force

Reactivity towards Oxygen: Halogen form many oxides with oxygen.

(i) Flourine:- (a) OF_2 → stable at 298 K
(b) O_2F_2

O_2F_2 oxidise Pu into PuF_6 which is used in removing Pu from spent nuclear reactor.

(ii) Chlorine (a) Cl_2O
(b) ClO_2
(c) Cl_2O_6
(d) Cl_2O_7

Imp. ClO_2 is used as a bleaching agent for paper pulp and textile industries.

(iii) Bromine (a) Br_2O
(b) BrO_2
(c) BrO_3

- They are very powerful oxidising agent

(iv) Iodine (a) I_2O_4
(b) I_2O_5
(c) I_2O_7

They are insoluble solid and decompose on Heating
I_2O_5 is a very good oxidising Ag. And is used in the estimation of carbon Monoxide

(v) Reactivity towards Metals:
Metal + Halogen → Metal Halide
eg:- NaCl, NaBr, $MgCl_2$, $MgBr_2$ etc.
Order of Ionic character → MF > MCl > MBr > MI
M = Na, K, Rb, etc.

The Halide of metal in higher oxidation state will be more covalent than lower oxidation state.

Eg:- $\overset{+2}{Mg}Cl_2 > \overset{+1}{Na}Cl$

$\overset{+5}{P}Cl_5 > \overset{+3}{P}Cl_3$
↑ P.P more ↑ P.P less
P.P ∝ Covalent character.

CHLORINE (Cl_2)

- Discovered in 1774 by Schule
- Davy established its elementary nature. i.e greenish yellow.

Preparation

$$MnO_2 + 4HCl \longrightarrow MnCl_2 + Cl_2 + 2H_2O$$

$$2KMnO_4 + 16HCl \longrightarrow 2KCl + 2MnCl_2 + 8H_2O + 5Cl_2$$

Properties.

- It is greenish yellow gas with pungent and suffocating odour.
- Reaction with Ammonia.

$$8NH_3 + 3Cl_2 \longrightarrow 6NH_4Cl + N_2$$
excess

$$NH_3 + 3Cl_2 \longrightarrow NCl_3 + 3HCl$$
Excess — explosive liq.

2014 17 • Reaction with NaOH

$$6NaOH + 3Cl_2 \xrightarrow{\text{Hot}} 5NaCl + NaClO_3 + 3H_2O$$
Conc. — Sodium chlorate

$$2NaOH + Cl_2 \xrightarrow{\text{Cold}} NaCl + NaClO + H_2O$$
~~Conc~~ dil — Sodium ~~chlorate~~ hypochlorite

- Same R^n occurs with Br_2 and I_2

Reaction with dry Slaked lime

$$2Ca(OH)_2 + 2Cl_2 \longrightarrow \underbrace{Ca(OCl)_2 + CaCl_2}_{\text{Bleaching powder}} + 2H_2O$$

Note:- Chlorine on standing loses its yellow colour due to formation of HCl and HOCl.

$$Cl_2 + H_2O \longrightarrow HCl + HOCl$$
$$\downarrow$$
$$HCl + [O]$$
Nascent oxygen.

- Therefore mixture of Cl_2 and H_2O is used for oxidation and bleaching property.
- It is a powerful bleaching agent and bleaching action is due to oxidation.

Coloured substance + [O] → Colourless substance.

- Its bleaching action is permanent.

Uses.

- In the preparation of poisonous Gases like phosgene gas ($COCl_2$), Tear gas (CCl_3NO_2) and Mustard gas

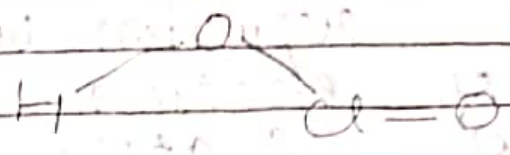
2020. OXOACIDS OF HALOGEN.

Due to high electronegativity and small size of F-atom it form only <u>one</u> oxoacid HOF because F atom not act as central atom.

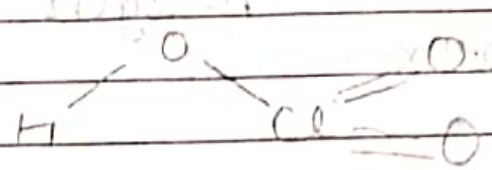
Structures.

(i) HOCl
(Hypochlorus Acid)

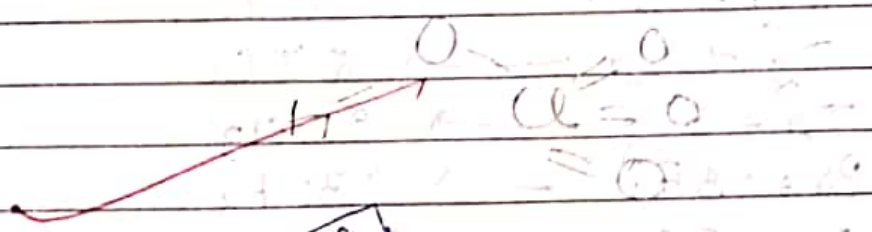
1) $HOClO$ / $HClO_2$ (Chlorous acid)



2) $HOClO_2$ / $HClO_3$ (Chloric Acid).



3) $HOClO_3$ / $HClO_4$ (Perchloric Acid).



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Interhalogen Compounds.

Binary compounds of two different Halogen having general formula XX'_n are called interhalogen compound.

XX'_n

$n = 1, 3, 5, 7$

X = Large size

X' = small size.

Interhalogen compounds are more reactive than Halogen. This is due to $X-X'$ bond is more polar and weak than $X-X$ bond which require high Energy for breaking.

F_2 is more reactive than interhalogen compound due to large interelectronic repulsion between loan pair of electron on small size of F-atom.

- The melting point is little higher than halogen due to polar nature.

Preparation :-

$$Cl_2 + F_2 \xrightarrow{437K} 2ClF$$
$$Cl_2 + 3F_2 \xrightarrow{573K} 2ClF_3$$
$$I_2 + Cl_2 \longrightarrow 2ICl$$
$$I_2 + 3Cl_2 \longrightarrow 2ICl_3$$
$$Br_2 + 3F_2 \longrightarrow 2BrF_3$$
$$Br_2 + 5F_2 \longrightarrow 2BrF_5$$

Types of interhalogen Compounds.

(I) XX^1 type → ClF, BrF, BrCl (solid), ICl.
I, Br

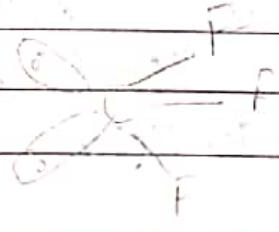
- IF is very unstable due to large size of I and small size of F.

2014, 18. (II) XX^1_3 type → ClF_3, BrF_3, IF_3, ICl_3

- ICl_3 form dimer i.e I_2Cl_6.

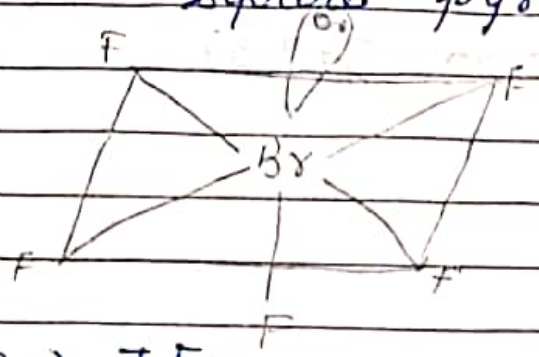
All are bent - T - shape compounds

Eg ClF_3 (Cl = 7)

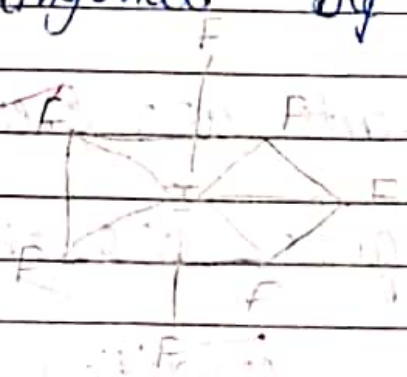


ii) XX'_5 type → IF_5, BrF_3, ClF_5
all are square pyramidal shape

BrF_5



v) XX'_7 type → IF_7.
It is pentagonal by pyramidal.



Uses.
ClF_3 and BrF_3 are used for the production of UF_6 which is rich in U^{235}

$$U + 3ClF_3 \longrightarrow UF_6 + 3ClF$$

GROUP - 18 ELEMENTS
(zero group).

He
Ne
Ar
Kr
Xe
Rn - Radioactive.

- Following elements are present in this group.
- All these gases are chemically unreactive i.e inert.

Imp. In special condition they form few compound therefore these are noble gases.

- All are present in atmosphere (1%) except Rn.
- Ar is the major constituent of these gases in air.
- He and Ne are also found in mineral of radioactive origin like pitch blende, monazite, Clevite.

- General E.C :- $ns^2 np^6$
- I.P = Due to stable configuration these gases have very high I.P in P.T.
- It decreases down the group.
- Atomic radii :- Increase down the

group with increase in atomic number.

E.G.P:- They have large +ve E.g.P due to stable configuration.

Physical properties.

- All the nobel gases are monoatomic
- They have low m.p and b.p due to presence of weak wanderwal force (dispersion force).

Chemical properties.

- These are least reactive gases due to
(i) stable configuration
(ii) High Ionisation Enthalpy
(iii) Positive E.g.P.

Note:- In 1962 Barllet prepared a Red compo $[O_2^+ \cdot PtF_6^-]$ and observed that first e.g.P of molecular O_2 was identical with Xe.

He prepared same type of compount with Xenon i.e. $[Xe^+PtF_6^-]$.

- After the discovery of $XePtF_6$ a number of xenon compound has been synthesised
* KrF_2 is known.

Preparation:-

$$XeF_6 + F_2 \xrightarrow{673K} XeF_2.$$

$Xe + 2F_2 \rightarrow XeF_4$

$Xe + 3F_2 \xrightarrow[70\,bar]{573K} XeF_6$

$XeF_4 + O_2F_2 \longrightarrow XeF_6 + O_2$

These ~~cpd~~ are ~~synthesised~~ cystalline solid and sublime at 293 K.

- They are hydrolised with water
  $2XeF_2 + 2H_2O \rightarrow 2Xe + 4HF + O_2$

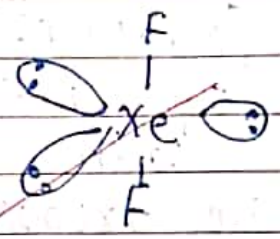
$XeF_2 + PF_5 \rightarrow [XeF]^+[PF_6]^-$

$XeF_4 + SbF_5 \rightarrow [XeF_3]^+[SbF_6]^-$

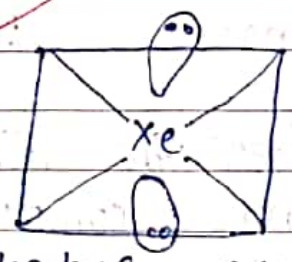
$XeF_6 + MF \rightarrow M^+[XeF_7]^-$
M = Metal of I A Group.

Structure.

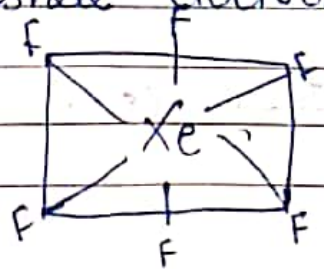
- XeF_2: It is linear shape.



- XeF_4: It is square planer.



- XeF_6: It is distroacted octahedral acc. to valence shell electron pair repulsion theory



Imp Xenon oxygen compound. Hydrolysis of XeF_4 and XeF_6 with water gives XeO_3

$$6XeF_4 + 12H_2O \longrightarrow 4Xe + 2XeO_3 + 24HF + 3O_2$$

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

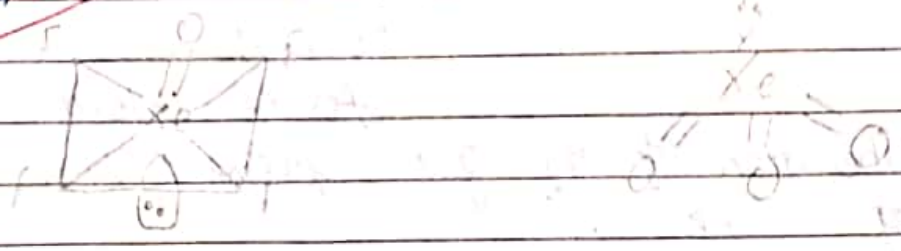
Partial hydrolysis of XeF_6 gives Oxofloride

$$\cancel{XeF_6 + XeO_3}$$

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

$$XeF_6 + 2H_2O \longrightarrow XeO_2F_2 + 4HF$$

- XeO_3 is a colourless explosive solid.
- $XeOF_4$ is a colourless volatile liquid



Uses.

(i) Helium:- It is non inflamable gas.
- Used in filling ballons.
- Used in gas cold Nuclear reactor.
- Used with O_2 with diving appea

(ii) Neon:- Used in dischage tube and fluorescent bulb for advertisement display purpose.
- Neon bulbs are used in Botanical garde and in green houses.

(iii) Argon:- Used for treating inert atmosphere

in the weiding of metal and alloys.
for filling electric bulb.

Q How is O_3 estimated quantitatively?

Ans When O_3 react with an excess of KI solⁿ I_2 is liberated which can be litrated against a standard solⁿ of sodium thiosulphate.

Q. When HCl react with finally powdered iron it form ferrous chloride not ferric chloride why?

Ans $Fe + 2HCl \longrightarrow FeCl_2 + H_2\uparrow$

ferrous chloride

$\downarrow$

$FeCl_3 H$

ferric chloride.

Liberation of H_2 gas prevent the formation of $FeCl_3$.

Q. Why ICl is more reactive then I_2.

Ans ICl is more reactive than I_2 because B and b/w I-Cl bond is more polar and weak and break easily than I_2.

Q. Does the hydrolysis of XeF_6 lead to redox rⁿ

No, Because $XeOF_4$ and $XeOF_2$ products are formed in which O.S of Xe is same.

$$\overset{+6}{\underline{Xe}}F_6 + H_2O \longrightarrow \overset{+6}{\underline{Xe}}OF_4 + \overset{+6}{\underline{Xe}}O_2F_2$$

Q Given the formula and describe the structure of Noble gas species which is isostructural with

1 ICl_4^- 2 IBr_2^- 3 BrO_3^-

ICl_4^- $I = 7$ $Cl = 7$

Total value of $\bar{e}$ = $7 + 7 \times 4 + 1$
$= 8 + 28 = 36$

XeF_4. $Xe = 8$ $F = 7$

Total valence e^- = $8 + 7 \times 4$
$= 36$

It is isostructural with XeF_4

2 IBr_2^- $I = 7$, $Br = 7$

Total valence e^- = $7 + 7 \times 2 + 1$
$= 22$

XeF_2 = $Xe = 8$, $F = 7$

Total valance $\bar{e}$ = $8 + 7 \times 2$
$= 22$

Here IBr_2^- is isostructural with XeF_2

3 BrO_3^- $Br = 7$ $O = 6$

Total valance $\bar{e}$ = $7 + 3 \times 6 + 1$
$= 26$

XeO_3

$Xe = 8$

$O = 6$

Total valence $\bar{e}$ = $8 + 3 \times 6$
$= 26$.

Thus BrO_3^- is isostructural XeO_3