

Oxides of halogens and Oxyacids of halogens

fluorides	OF_2	oxid ⁿ no. of halogen $\rightarrow$ $+4$			
	O_2F_2	-1			
oxides	Cl_2O	$+1$	ClO_2	$+6$	other $+7$
	Br_2O	$+1$	BrO_2	Cl_2O_6	Cl_2O_7 $+5$
			(Paramagnetic)	ClO_3	I_2O_5 $+7$
					I_4O_9 book, 1st?

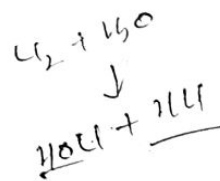
① OF_2 (oxygen difluoride)
Single halogen double oxygen $\rightarrow$ paramagnetic

Prep. $\rightarrow$ By passing fluorine gas in 2% aq. solⁿ of NaOH

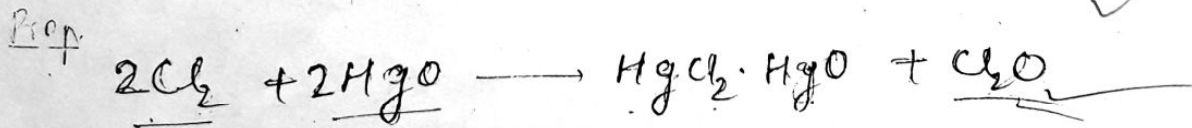


It is an oxidising agent.

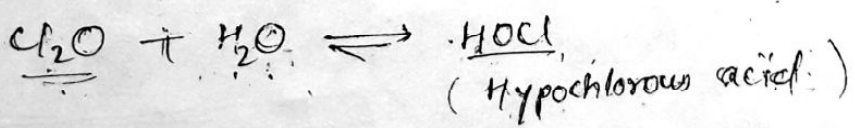
② $O_2F_2 \rightarrow$ It is unstable



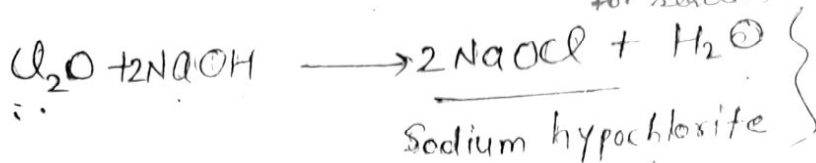
③ Cl_2O (dichlorine oxide)



Reaction

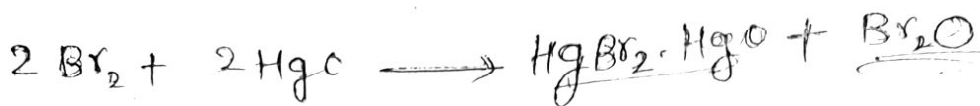


* method of synthesis }
39% }
for reaction follow up. (45)



(4) Br₂O (dibromine oxide)

Prep $\rightarrow$ Same as Cl_2O



* Interhalogen case
 $\downarrow$

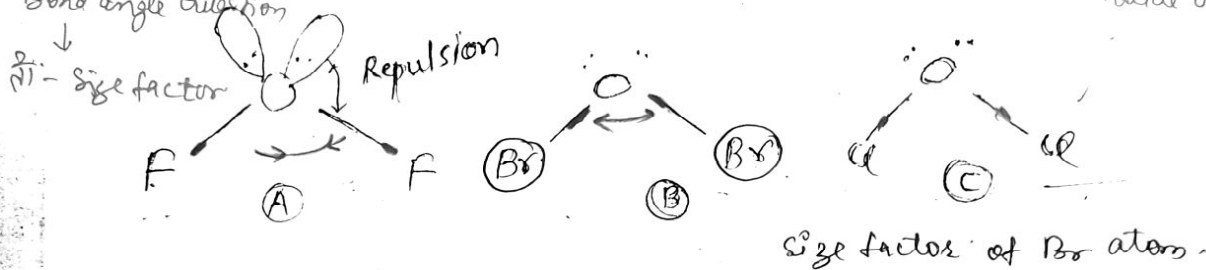
Bond angle Question
 $\downarrow$

Size factor
 $\downarrow$

Structure (OF_2 , Br_2O , Cl_2O)

Oxyhalide
 $\downarrow$

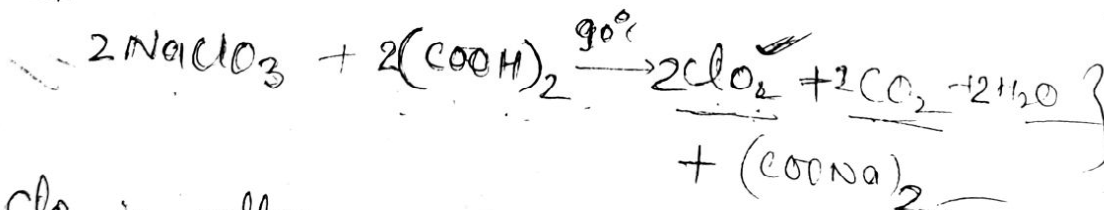
halide o.N.T-a



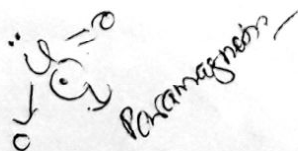
$\text{A} < \text{C} < \text{B} \rightarrow \uparrow$ order of bond angle.

(5) ClO₂ $\rightarrow$ (chlorine dioxide)

Prep. $\rightarrow$



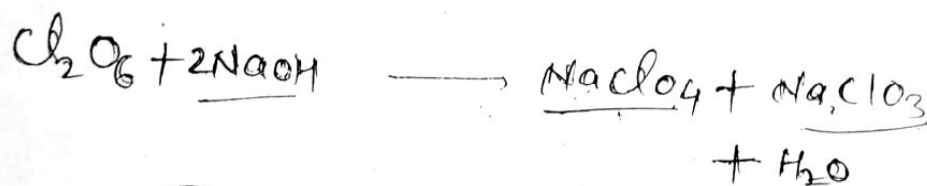
~~ClO₂~~ is yellow gas & forms brown red liquid
Here ClO_2 is diluted with CO_2



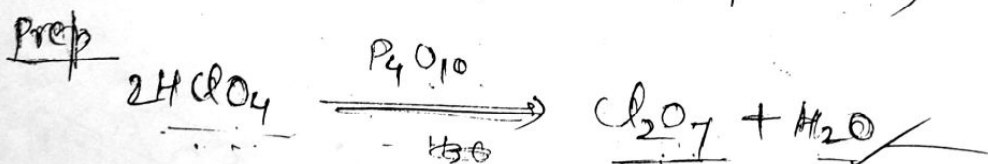
Reaction



⑥ Cl_2O_6 (Dichlorine hexaoxide)

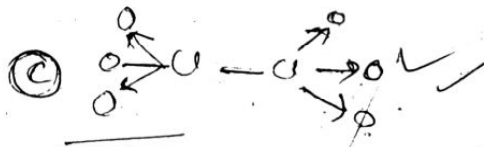
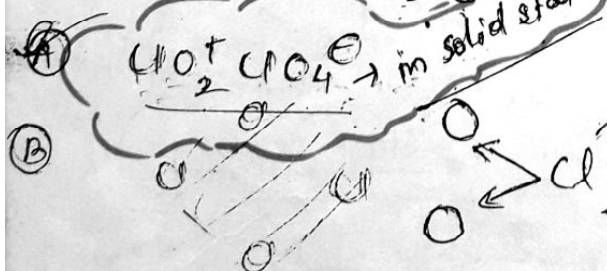


⑦ Cl_2O_7 (Dichlorine heptaoxide) ✓



Structures

① Cl_2O_6



Solid is low for

H_2O_5

P_4O_8

Cl_2O_6

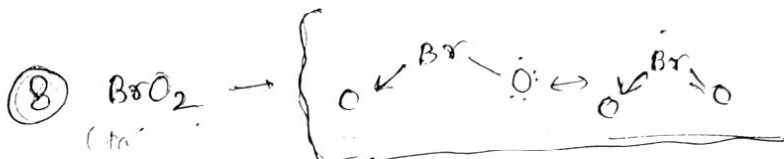
46

(*) यह सिलरह 3 element present हो तो
electronegativity & acidic nature

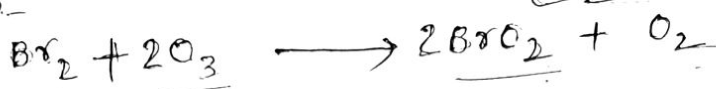
(47)



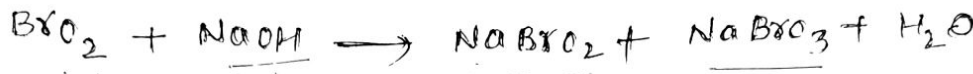
U₂O₇



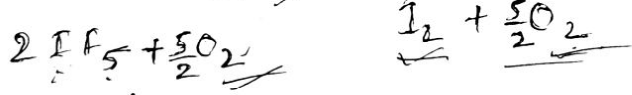
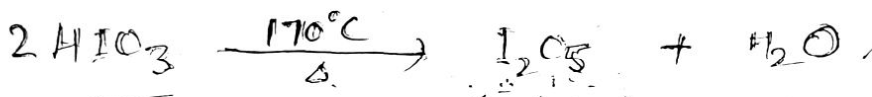
Prep-



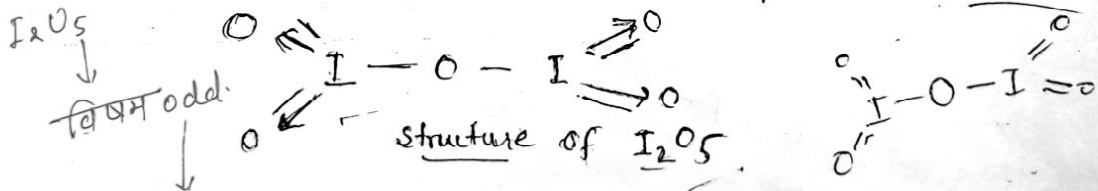
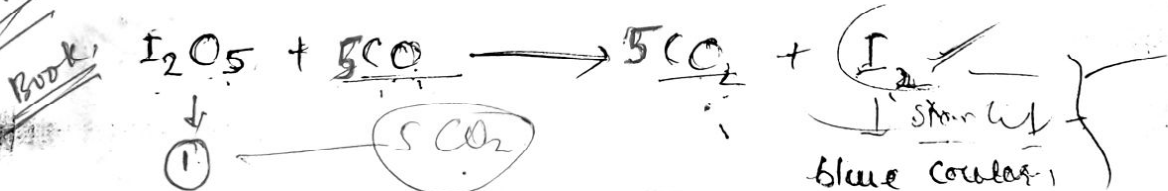
Reⁿ



I₂O₅ (Diodine pentoxide)



Uses $\rightarrow$ It used to estimate the CO



0 नियम भाग
बाकी भाग 2

- acidic nature
- hybridization
- structure

(48)

Oxy acids of Halogens

(+1) HXO

Hypohalous acid
(HXO)

	O.S. of Halogen
HOX	-1
$HOCl$	+1
$HOBr$	+1
HOI	+1

(+3) HXO_2

Halous acid

	O.S. of X
HXO_2	+3
$HClO_2$	

(+5) HXO_3

Halic acid

	O.S. of X
HXO_3 (+5)	
$HClO_3$	
$HBrO_3$	
$HOIO_3$	

(+7) HXO_4

Perhalic acid

	O.S. of X
HXO_4 (+7)	
$HClO_4$	
$HBrO_4$	
$HOIO_4$	

2 (*) Not

$HOI \rightarrow$ Hypoiodous acid
 $HClO_2 \rightarrow$ chlorous acid
 $HOIO_3 \rightarrow$ Iodic acid
 $HClO_3 \rightarrow$ chloric acid
 $HBrO_3 \rightarrow$ Bromic acid
 $HClO_4 \rightarrow$ Perchloric acid
 $HOIO_4 \rightarrow$ Periodic acid

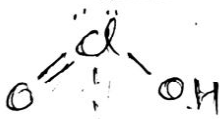
$ClO^- \rightarrow$ hypochlorite ion
 $IO^- \rightarrow$ hypoiodite "
 $ClO_2^- \rightarrow$ chlorite "
 $IO_3^- \rightarrow$ Iodate "
 $ClO_3^- \rightarrow$ chlorate "
 $BrO_3^- \rightarrow$ Bromate "
 $ClO_4^- \rightarrow$ Perchlorate "
 $IO_4^- \rightarrow$ Periodate "

structures



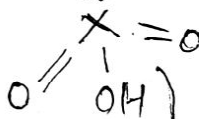
Angular (V shape)

Hybridisation State $\rightarrow$ sp^3



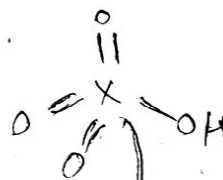
V-shape

sp^3



Trigonal pyramidal

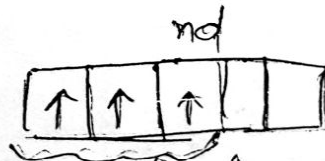
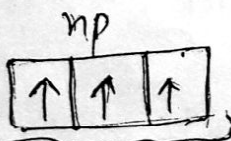
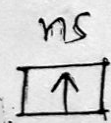
sp^3



Tetrahedral

sp^3

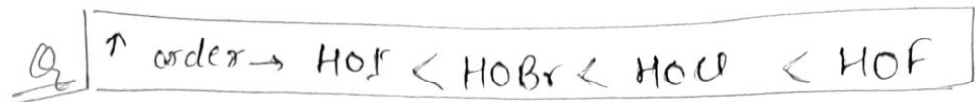
excited state of halogen in HXO_4



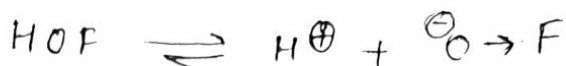
sp^3 hybridisation

form-3 π bonds

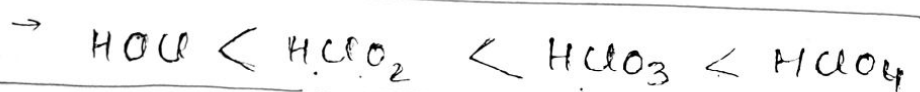
✓ Acid strengths of oxy acids of halogens



Explanation → The anion is better stabilized in HOF than others due to high electronegativity of F-atom

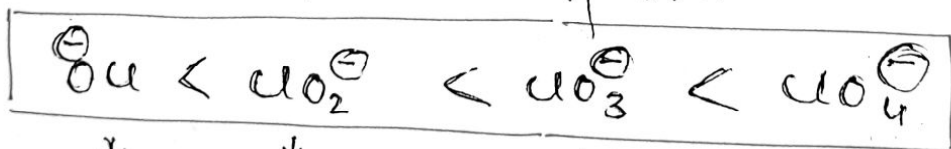


Net Q HFO_2 , HFO_3 & HFO_4 are not exist because F-atom ~~do~~ not ~~external~~ have d-orbitals, in their valence shell.



As oxidation no. of halogen atom increases; acid strength is also increases.

→ Explanation → Anions are stabilized by resonance in following order



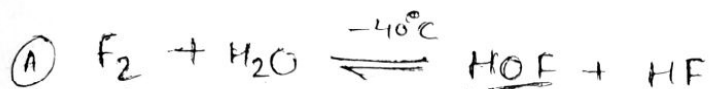
Res. structure → $\downarrow$ one $\downarrow$ Two $\downarrow$ Three $\downarrow$ four

Acids

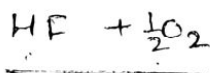
(50)

① $\text{HOX} \rightarrow$ Hypohalous acid

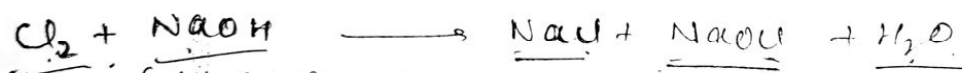
$\rightarrow$ These acids are unstable at room temp. but their salts are quite stable.



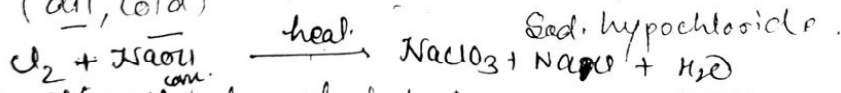
$\downarrow$ it decomposes { similarly other acids are decomposes



it salts $\rightarrow$ eg. NaOCl



(dil, cold)

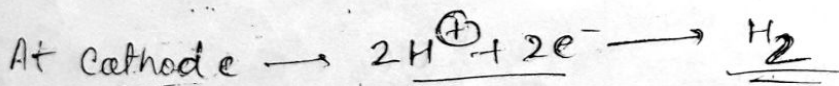
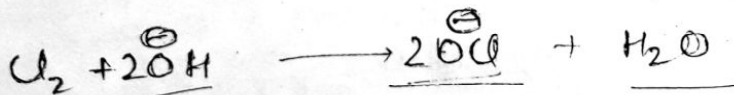


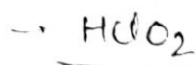
Sol. hypochlorite.

Prep. of NaOCl by electrolysis

PS - electrode - low temp.

Electrolyte $\rightarrow$ Alkaline solution of Cl^- ions

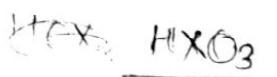
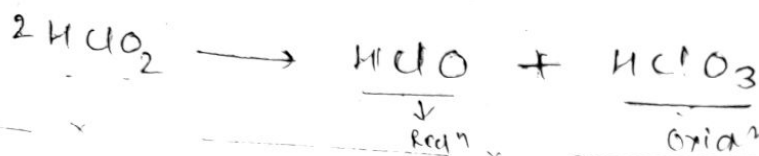




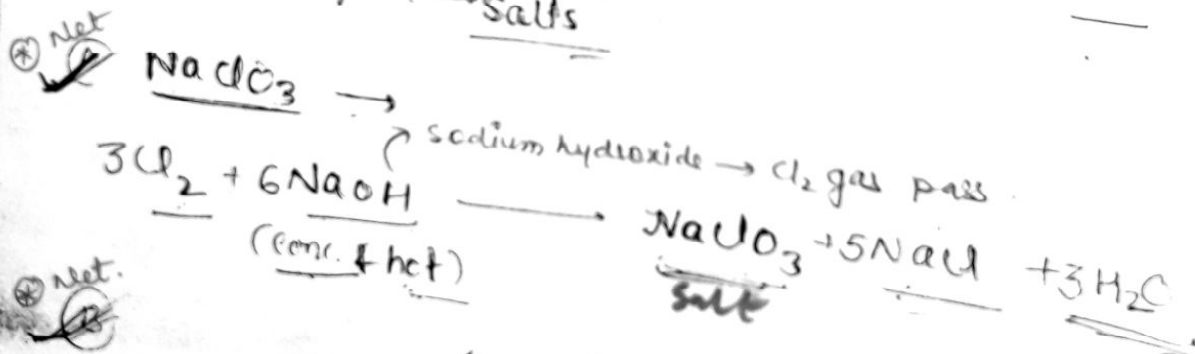
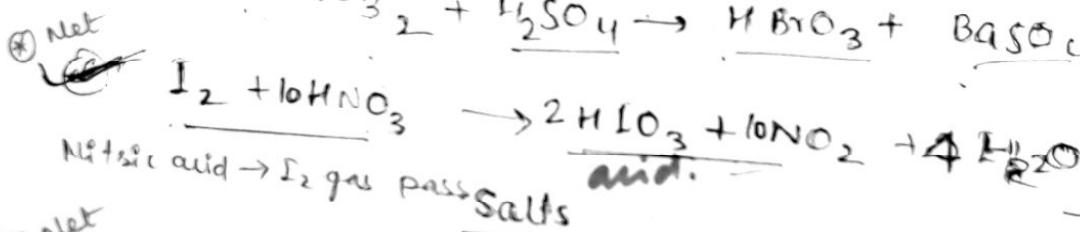
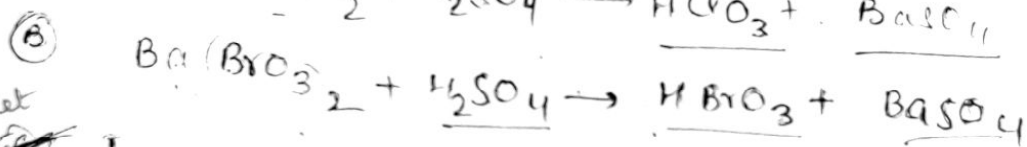
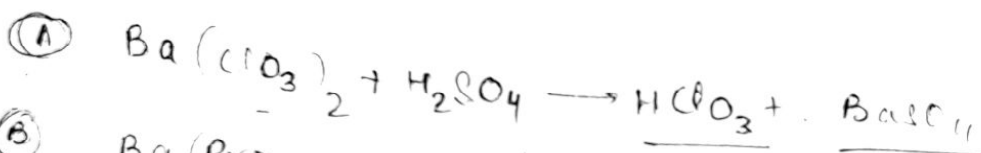
Prep.



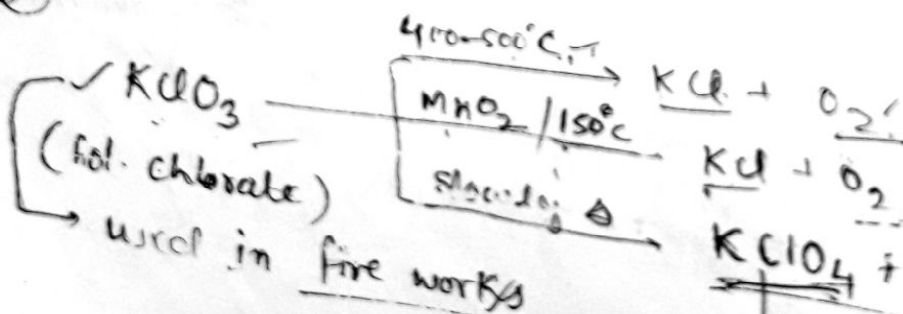
HClO₂ is unstable at high temp & it undergoes disproportionation reaction -

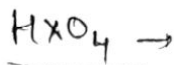


Prep.

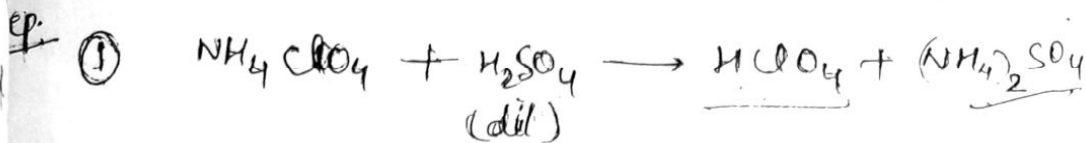


⑤ Net





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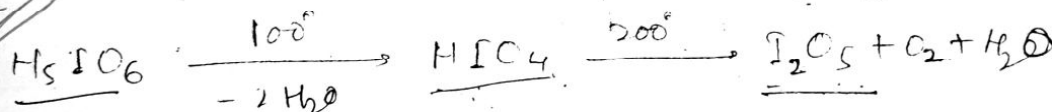
$HClO_4 \rightarrow$ Strongest acid.

Salt Prep $NaClO_4$

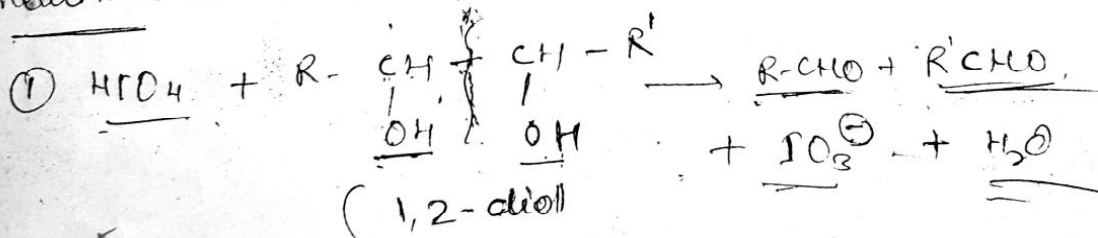


HIO_4 $\rightarrow$ ~~पर्याप्त मात्रा में नहीं मिलता~~ dehydration.

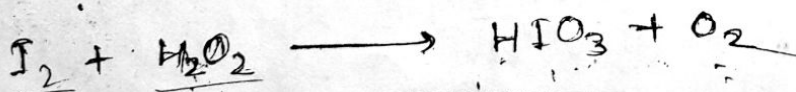
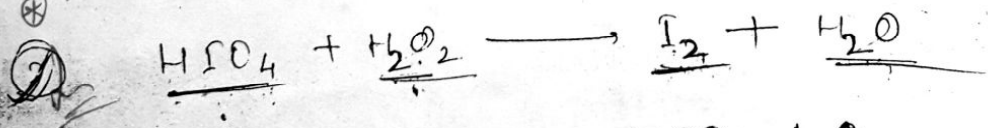
Its dihydrated form $HIO_4 \cdot 2H_2O$ (or H_5IO_6)
Periapsic acid



Reaction -



⊗ net



Oscillation Reaction (Blue $\rightleftharpoons$ colourless)

HIO_4 की reaction में product में H_2O ज्यादा निकलता है।