Halogen Family

			state	color
F	2nd p	Non-metal	→ Gas	→ yellow
Cl	3rd p		→ Gas	→ Greenish yellow
Br	4th p		→ Liquid	→ Brown red
I	5th p		→ solid.	→ Voilet

(At) → Metalloid.
└ Radioactive.

(X_2) ... (X_2) → vanderwaal's force of attraction
→ instantenous dipole – induced dipole
London dispersion force.

→ Bromine is only non-metal which is liquid at room tempr.
Hg → metal liq. at room tempr.

→ vanderwaal force of attraction ∝ molecular mass

*General configuration:- $ns^2 np^5$

Abhishek

① Atomic Radius
→ Top to bottom, radius ↑es.

F
Cl
Br
I
↓ Radius ↑

② Ionization energy

$I.E \propto \frac{1}{\text{radius}}$

F > Cl > Br > I

③ Electron affinity
→ Generally decreases down the group but 3rd period has more affinity than 2nd period due to small size of 2nd period element outer e^- feels repulsion.

→ Cl > F > Br > I

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④ Electro-Negativity -

④ F
③ Cl = N.
2.8 Br | decreases
2.5 I — C = S.

— Fluorine को highest in whole p.t.

⑤ Bond energy

Q. Which of the following has highest bond energy?

ⓐ F_2 ~~ⓑ~~ Cl_2 ⓒ Br_2 ⓓ I_2

F—F: inter electronic repulsion हुन्छ — strain develop हुन्छ — so weak bond भइहाल्छ

~~Cl—Cl~~ Cl
Br — Br
I — I

$\boxed{Cl_2 > Br_2 > F_2 > I_2}$ — B.D.E

F - F	O - O	N - N	C - C
Cl - Cl	S - S	P - P	Si - Si
Br - Br	Se - Se	As - As	Ge - Ge
I - I	Te - Te	Sb - Sb	Sn - Sn

no change

⑥ Melting point & boiling point

F_2
Cl_2
Br_2
I_2

mpt & bpt ↑es.

$\boxed{B.pt \propto \frac{1}{volatility}}$

$\boxed{mpt \ \& \ B.pt \propto \text{vanderwaal force of attraction} \propto \text{molecular mass}}$

→ B.pt → HF > H-I > HBr > HCl
due to +nce of H-bond

⑦ Oxidising power

$F_2 > Cl_2 > Br_2 > I_2$

SRP → $F_2 > Cl_2 > Br_2 > I_2$.

SRP ↑, reduction ↑es, oxidising power ↑es.

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⑧ Reaction with H_2O

$$\overset{0}{F_2} + H_2O \longrightarrow H\overset{-1}{F} + O_2$$

(redn / oxidising agent)

→ $Cl_2 + H_2O \longrightarrow HCl + HOCl$

→ $Br_2 + H_2O \longrightarrow HBr + HOBr$

] redox rxn.

$I_2 + H_2O \longrightarrow$ No rxn.

⑨ Oxidation state

-1 to $+7$.

exception:→ F shows only -1 O.S.
due to ① EN highest in P.T.
② absence of vacant 'd' orbital.

⑩ Density:-

↑es down the group due to increase in atomic mass.

$I_2 > Br_2 > Cl_2 > F_2$.

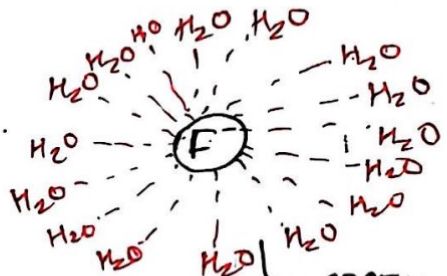
⑪ Reactivity:

$F_2 > Cl_2 > Br_2 > I_2$

⑫ Hydration energy:-

$F^- > Cl^- > Br^- > I^-$

- Small ions shows more hydration.



→ $F^-_{(aq)} > Cl^-_{(aq)} > Br^-_{(aq)} > I^-_{(aq)}$ → Hydrated size

energy release → Hydration energy

→ $F^- < Cl^- < Br^- < I^-$ → size (normal)

Anamolous Behaviour of Fluorine

- small radius.
- only shows -1 O.S.
- Absence of 'd' orbital.
- AgF is soluble in water but AgCl, AgBr & AgI are insoluble
- CaF_2 is insoluble but $CaCl_2$, $CaBr_2$, CaI_2 are soluble.
- It react vollently with H_2

$$H_2 + F_2 \xrightarrow{dark} HF$$

* $HI > HBr > HCl > HF$ → Acidic character

HX (Hydra acids)

prepr

① $H_2 + X_2 \longrightarrow HX$.

reactivity → $F_2 > Cl_2 > Br_2 > I_2$

$H_2 + F_2 \xrightarrow{dark} HF$

$H_2 + Cl_2 \xrightarrow{Sunlight} HCl$.

② $CaF_2 + H_2SO_4 \longrightarrow CaSO_4 + HF$

$NaCl + H_2SO_4 \longrightarrow Na_2SO_4 + HCl$.

$NaI + H_2SO_4 \longrightarrow Na_2SO_4 + HI$ (HI — reducing agent)

$NaI + H_2SO_4$ (L.O.A.) → H_3PO_4 (non O.A) → $Na_3PO_4 + HI$

$HI + H_2SO_4 \longrightarrow I_2 + SO_2$ ↑.

Note: By using metal bromide & metal iodide, HBr & HI not formed because HBr & HI are good reducing agent & H_2SO_4 is good oxidising agent. So, redox rxn occurs.

* Layer Test:- Test of Br^- & I^-.

violet color layer

reddish brown layer

$$NaI \xrightarrow[\Delta]{H_2SO_4} HI \xrightarrow{H_2SO_4} I_2$$

I_2 + CCl_4 → violet color layer.

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* Properties

① HF, HCl, HBr HI

size ↑es, Bond length ↑es, Bond Dis. energy ↓es., Thermal stability ↓es

Reducing agent / character ↑es, Acidic strength ↑es. volatility ↓es

B.pt → HF > HI > HBr > HCl.

HF: H-bonding → volatily least.

HI > HBr > HCl: molecular mass

• HF → not store in glass bottle because it react with SiO_2 & soluble complex form.

$$SiO_2 \xrightarrow{4HF} SiF_4 + 2H_2O$$

$$SiF_4 \xrightarrow{2HF} H_2[SiF_6]$$

$H_2[SiF_6]$ → soluble complex

② Oxide

① $\overset{+1}{Cl_2}O \xrightarrow{H_2O} H\overset{+1}{Cl}O$ → Hypochlorous acid

$\xleftarrow{\Delta}$ $-H_2O$

$\overset{+1}{Cl_2}O$ → anhydride of hypochlorous acid.

② Cl_2O_6 (s) → $ClO_2^+ + ClO_4^-$

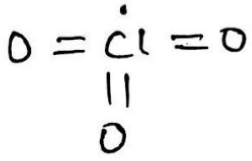
Cl_2O_6 (s) → ionic solid

ClO_2^+: $O=\overset{\oplus}{Cl}=O$ — 2+1=3. (σ i.p.) — sp^2 hybridized Angular shape.

ClO_4^-: $O=\overset{O^-}{Cl}=O$ (with $O=Cl=O$ → $Cl=O$) — 4+0=4. (σ) — sp^3 → tetrahedral str.

③ ClO_3 →

$$O=\dot{Cl}=O$$
$$\quad\;\; \| $$
$$\quad\;\; O$$



④ Cl_2O_6 → Two ClO_3 unit joined by unpaired electron.

$O_3Cl - ClO_3$.

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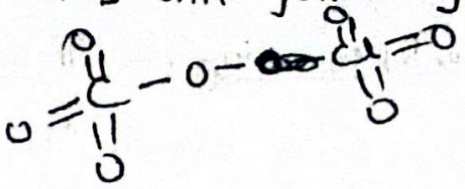
⑤ Cl_2O_7 : $O_3Cl-O-ClO_3$

→ Two ClO_3 unit joined by common oxygen.



$Cl_2O_7 + H_2O \longrightarrow HClO_4$

↓ anhydride of perchloric acid.

$\xleftarrow{\Delta}$ $-H_2O$

↳ perchloric acid.

⑥ ClO_2



→ 2 centred – 3 e^- bond tnt in this molecule

→ 3 e^- bond / odd e^- bond.

Hybridization = 2+1 = 3 sp^2

↳ angular

– 117.5° Bond angle

→ paramagnetic in nature.

– odd e^- molecule.

→ ClO_2 molecule has neglibile tendency to dimerize but NO_2 readily dimerize.

↓ because of delocalized of e^-

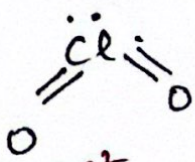
$2NO_2 \longrightarrow N_2O_4$ ✓

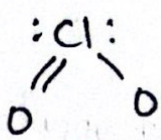
$2ClO_2 \longrightarrow Cl_2O_4$ ✗.

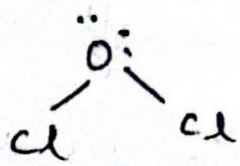
7+12 = 19 e^- ← ClO_2 — ClO_2^+ ↳ 18 e^-

↓ para ↓ dia.

* ClO_2 ClO_2^- Cl_2O







Hyb → sp^2 sp^3 sp^3

B.A → 117.5 110.5° 110°

③ Oxyacid

A. **HClO** (Hypochlorous acid)

→ H–O–Cl ✓ [not H–Cl–O ×2]

chlorous acid

$HClO_2$ → H–O–Cl=O

$HClO_3$ → H–O–Cl(=O)=O

↓ chloric acid

$HClO_4$ → H–O–Cl(=O)(=O)=O

↓ perchloric acid.

Note: F only forms HOF

but other halogen forms oxyacid. due to vacant d-orbital

HOF → $H^{+1}-O-F^{-1}$

↓

O → O.S.

→

$H\overset{+1}{Cl}O$	$H\overset{+3}{Cl}O_2$	$H\overset{+5}{Cl}O_3$	$H\overset{+7}{Cl}O_4$
↓	↓	↓	↓
ClO^-	ClO_2^-	ClO_3^-	ClO_4^-
Resonating str → 0	$^-O-Cl=O$ ↔ $O=Cl-O$: 2	3	4.

→ No. of resonating str ↑es,
stability of anion ↑es. acidic strength ↑es.

Oxidising character ∝ Oxidation state General Trend

but $HClO > HClO_2 > HClO_3 > HClO_4$ → exception

- $HClO$: unstable, no resonance. ↓ bond long ↓ easily break ↳ [O].
- $HClO_4$: max resonance. ↓ more double bond character ↳ break hardly.

→ ClO_4 bond ↑es, B.L ↓es.
T.S ↑es, O.S. ↓es.

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Q. ~~HCO~~ $HClO_4 > HClO_2 > HClO_3 > HClO_4$. – correct order for:–

(a) oxiding agent (b) Thermal stability. ↳ opsit.
(c) acidic character ↓ opsit (d) All

Q. $HClO$ / $HClO_2$ / $HClO_3$ / $HClO_4$ resemble in:–
→ pyramidal shape.
↳ tetrahedral shape.

(a) shape (b) Bond angle (c) No. of π-bond
(d) Hybridization ↓ sp^3 of all. (e) Monobasic ↳ all.

Q. ClO bond is minimum in:–

(a) ClO^- (b) ClO_2^- (c) ClO_3^- (d) ClO_4^- (e) Same.

#

① F_2 :–

source:- cryolite → Na_3AlF_6

Fluorspar → CaF_2

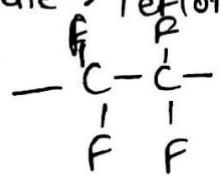
→ AlF_3 $\xrightarrow[HF]{anhy.}$ insoluble.

↓ NaF^-

soluble ↳ formation of soluble complex
↳ $Na_3[AlF_6]$

→ anhy. HF is covalent & does not provide F^-. So, insoluble.

Uses: poly tetra fluoro ethene → Teflon.
↓
$nF_2C=CF_2$ →



– Freon → chloro fluoro carbon

② Cl_2 :–

source:– Rock salt – NaCl

Brine solution → aq. NaCl

carnalite → $KCl.MgCl_2.6H_2O$

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Uses → ① Bleaching agent → wet bleach.

② Purification of water as it has germicide nature.

③ Poisonous gas.
eg. Phosgene → $COCl_2$

④ Mustard gas → $(ClCH_2CH_2S)_2$

⑤ Tear gas → CCl_3NO_2
↳ chloropicrin

prepr

① Deacon's process:-

$$HCl + \underset{air}{O_2} \xrightarrow[\text{catalyst}]{CuCl_2} Cl_2 + H_2O$$

② $MnO_2 + HCl \longrightarrow MnO + H_2O + Cl_2$
O.A
$\downarrow HCl$
$MnCl_2 + H_2O$
$\rightarrow MnCl_2 + 2H_2O + Cl_2$.

$\rightarrow MnO_2 \xrightarrow{KCl + H_2SO_4} Cl_2 + MnCl_2 + H_2O$.
$HCl + K_2SO_4$

③ aq. NaCl $\xrightarrow[\text{O.A.}]{F_2} Cl_2 + NaF$
$\downarrow I_2$
No rxn.

O.A → $F_2 > Cl_2 > Br_2 > I_2$
↳ can replace any halogen

$X^- \xrightarrow{F_2} X_2 + 2F^-$
↳ Cl^-, Br^-, I^-

$X^- \xrightarrow{Br_2} X_2 + 2Br^-$
↳ only I^-

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→ Aq. KF
KCl
KBr
I_2 (weak O.A) → No rxn.

but

→ $I_2 + H_2S^{-2} \longrightarrow \cdot \overset{0}{S} + 2HI$

(I_2: O.A, H_2S^{-2}: R.A)

Q. Aq. KI $\xrightarrow[\text{water}]{\text{chlorine}}$ $I_2 + KCl$.

$Cl_2 + H_2O$ (O.A)

I_2 → CCl_4 solvent → voilet color layer.

④ $\underset{\text{O.A}}{KMnO_4} + HCl \longrightarrow Cl_2 + Mn^{+2}$

$O_2 + HCl \longrightarrow Cl_2$

$MnO_2 + HCl \longrightarrow Cl_2$

$F_2 + NaCl \longrightarrow Cl_2$

⑤ Fused NaCl $\xrightarrow{\text{electrolysis}}$ $Na^+ + Cl^-$

$Na^+ \downarrow e^-$ → Na

$Cl^- \downarrow -e^-$ → $\frac{1}{2}Cl_2$ (anode)

⑥ Aq. NaCl $\xrightarrow{\text{electrolysis}}$ $Na^+ + Cl^- \longrightarrow \frac{1}{2}Cl_2$

$HOH \rightarrow H^+ + OH^-$

$H^+ \downarrow e^-$ → $\frac{1}{2}H_2$

$Na^+ + OH^-$ → NaOH

NaOH + $\frac{1}{2}H_2$ + $\frac{1}{2}Cl_2$

$\frac{1}{2}H_2$: cathode, $\frac{1}{2}Cl_2$: anode

Q. Aq. NaCl $\xrightarrow{\text{electrolysis}}$?

(a) H_2, O_2 (b) O_2, Cl_2 (c) H_2, Cl_2

Q. Elements of which one of the following groups will form anions most easily?

(a) Oxygen group (b) Nitrogen group (c) Halogens (d) Alkali metals

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Q. The correct order of E.N of N, O, F & P is:—

(a) F > N > P > O (b) F > O > P > N

(c) F > O > N > P (d) N > O > F > P

4 3.5 5 2

Q. Which statement is correct about halogens?

(a) They are all diatomic & form universal ions.

(b) They are all capable of exhibiting several oxidation states. [F except]

(c) They are all diatomic & form divalent ions.

(d) They can mutually displace each other from the solution to their compounds with metals.

Q. At the ordinary temp & pressure, among halogens, chlorine is a gas, Bromine is liquid & iodine is solid. This is because

↳ Intermolecular force among molecules of chlorine are the weakest & those in the iodine the strongest.

Q. Astatine is the element below iodine in group VII A of the P.T. Which of the following is not true for Astatine?

(a) It is less electronegative than iodine.

(b) It will exhibit only −1 O.S. — F^-

(c) Intermolecular force between the astatine molecules will be larger than between the iodine molecules.

(d) It is composed of diatomic molecule.

Q. Out of the elements, with atomic no. given below, which one will be halogen?

(a) 25 (b) 35 (c) 45 (d) 55

Q. Which of the following halogen is purified by sublimation?

(a) F_2 (b) Cl_2 (c) Br_2 (d) I_2

Q. True statement:—

(a) Silicon exhibits 4 co-ordination no. in its compounds.

(b) Bond energy of F_2 is less than Cl_2

(c) Mn(III) oxidation state is more stable than Mn(II) in aq. state.

(d) elements of 4th group show only +2 & +4 oxidation state

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Q. Mark the halogen which is solid at room temp^r?

(a) F (b) Cl_2 (c) Br (d) I

Q. Volatile nature of halogens is because?

(a) The halogen molecules are more reactive

(b) The forces existing between the molecules are only weak vanderwaal force

(c) Halogen molecules are bound by strong force

Q. Which reaction is not fisible?

(a) $2KI + Br_2 \rightarrow 2KBr + I_2$

(b) $2KBr + I_2 \longrightarrow 2KI + Br_2$

(c) $2KBr + Cl_2 \rightarrow 2KCl + Br_2$

(d) $2H_2O + 2F_2 \rightarrow 4HF + O_2$

Q. When iodine react with NaF, NaBr & NaCl?

(a) It gives a mixture of F_2, Cl_2 & Br_2

(b) It gives chlorine

(c) It gives Bromine

(d) None

Q. Fluorine doesnot form positive oxidation state because

(a) It is most el+ve element.

(b) It forms only anions in ionic compounds.

(c) It cannot form multiple bonding

(d) It shows non-bonding electron pair repulsion due to small size

Q. Which one of the following arrangements represents the correct order of electron gain enthaphy (with -ve sign) of given atomic sps?

(a) F < Cl < O < S (b) S < O < Cl < F

(c) O < S < F < Cl (d) Cl < F < S < O

Q. For electron affinity of halogens which of the following is correct?

(a) Br > F (b) F > Cl (c) Br > Cl (d) F > I

Q. The correct order of electron affinity among the following?

(a) Br > Cl > F (b) Cl > F > Br

(c) F > Cl > Br (d) F > Br > Cl

Q. B.D.E → $Cl_2 > Br > I_2$

Q. Among Cl^-, Br^- & I^-, the correct order of being oxidized to dihalogen is :-

(a) Cl^-, Br^-, I^- (b) I^-, Cl^-, Br^- (c) Br^-, I^-, Cl^- (d) I^-, Br^-, Cl

Q. Oxidizing action increases :- $I < Br < Cl < F$.

Q. Which of the following is strongest oxidising agent?

(a) F_2 (b) Cl_2 (c) Br_2 (d) I_2

Q. Mark the compound which can displace 3 halogens from their compounds?

(a) F (b) Cl (c) Br (d) I

Q. Which of the following will displace the halogen from the solution of the halide?

(a) Br_2 added to NaCl solution

(b) Cl_2 added to KCl solution

(c) Cl_2 added to NaF solution

(d) Br_2 added to KI solution

Q. Which of the following is not in accordance with the property stated against it?

(a) $HI > HBr > HCl > HF$ (acidic property in H_2O)

(b) $F_2 > Cl_2 > Br_2 > I_2$ (Electronegativity)

(c) $F_2 > Cl_2 > Br_2 > I_2$ (B.D.E)

(d) $F_2 > Cl_2 > Br_2 > I_2$ (oxidizing power)

Q. In the known interhalogen compound, the maximum no of halogen atom

(a) 4 (b) 5 (c) 7 (d) 8 (IF_7) 8.

Q. Which doesnot form interhalogen compound?

(a) F_2 (b) Cl_2 (c) Br_2 (d) None

Q. Which statement is not true?

(a) Fluorine is only halogen that doesnot show a variable o.s.

(b) HOCl is stronger acid than HOBr.

(c) HF is stronger acid than HCl.

(d) Among halide ions, iodide is most powerful reducing agent.

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Q. Which of the following is pseudo halogen?
(a) IF_7 (b) $(CN)_2$ (c) ICl_2^- (d) I_3^-

Q. The halogen that is most easily reduced?
(a) F_2 (b) Cl_2 (c) Br_2 (d) I_2

Q. Which of the following halogen oxidizes water to oxygen with evolution of large amount of heat?
(a) F_2 (b) Cl_2 (c) Br_2 (d) I_2

Interhalogen compound

→ Different halogen.

AB → IF, ICl, IBr, BrF, - - -
AB_3 – IF_3, ICl_3, BrF_3, ClF_3 - -
AB_5 – IF_5, BrF_5 - -
AB_7 – IF_7 only

properties :-

① Interhalogen are more reactive than halogen except F_2. because X–X' bond is weaker than X–X bond of halogen.
∴ ICl more reactive than Cl_2.

② On hydrolysis, HX and Oxyacid form.

$$\overset{\delta+}{I}\overset{\delta-}{Cl_3} + \overset{\delta+}{H}\overset{\delta-}{OH} \longrightarrow HCl + \overset{+3}{H}IO_2 \text{ (not } H\overset{+1}{I}O)$$

$$BrF_5 + HOH \longrightarrow HF + \overset{+5}{H}BrO_3$$

Note: Interhalogen on hydrolysis form XO^-, XO_2^-, XO_3^-, XO_4^-.

Halogen molecule disproportionate in Base.

F_2 | Cl_2 | Br_2 | I_2 $\xrightarrow[\text{cold/dil}]{NaOH}$ $NaCl + NaO\overset{+1}{Cl}$.
↳ Hypo halide

F_2 does not disproportionate

$\xrightarrow[\text{hot/conc}]{NaOH}$ $NaCl + NaClO_3$.
halide halate.

but, $\overset{0}{F_2} \longrightarrow \overset{+1}{Na}\overset{-1}{F}$ only (no +ve O.S).

Pseudohalide

→ Uninegative species having at least ~~1 negative~~ 1 nitrogen & ~~not~~ property resemble with halide.

e.g. CN^- → pseudohalide

→ $HI \leftarrow I^- \longrightarrow I_2 \xrightarrow{NaOH} NaI + NaOI$

→ $HCN \leftarrow CN^- \rightarrow (CN)_2 \xrightarrow{NaOH} NaCN + NaOCN$

↓ cyanogen

* $CuSO_4 + 2KI \longrightarrow K_2SO_4 + Cu_2I_2$

↓

$CuI + I_2$

$\rightarrow K_2SO_4 + CuI + I_2$.

* $CuSO_4 + KCN \longrightarrow K_2SO_4 + CuCN + (CN)_2$

Q. Which is pseudo halide?

(a) CN^- (b) SCN^- (c) OCN^- (d) N_3^- ~~(e) All~~

Q. $CuSO_4 + \underset{(excess)}{KCN} \longrightarrow CuCN + KCN \longrightarrow [Cu(CN)_4]^{-3}$ [II]

complex

Q. Which molecule does not disproportionate in Base?

(a) ~~Cl~~ $Cl_2 \xrightarrow{OH^-}$

(b) $(CN)_2 \xrightarrow{OH^-}$

(c) $P_4 \xrightarrow{OH^-} PH_3 + NaH_2PO_2$.

~~(d)~~ $F_2 \xrightarrow{OH^-}$

Polyhalide

XY_{2n}^- $n = 1, 2, 3, - - - -$

→ ICl_2^-

→ $II_2^- = I_3^-$

→ Cl_3^- but F_3^- → not polyhalide (vacant d-orbital absent).

$Cl_3^- \rightarrow \underset{\text{donor}}{Cl^-} + \underset{\text{acceptor}}{Cl_2}$

↓ Base ↓ acid.

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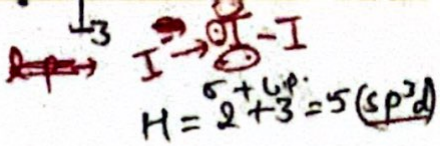
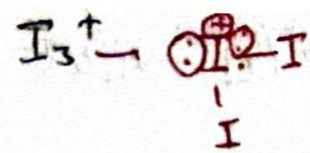


$H = 2+3 = 5 (sp^3d)$

Shape → linear



$H = 2+2 = 4 (sp^3)$

shape → angular.

→ $KI_3 \xrightarrow{\Delta} KI + I_2$

→ $KICl_2 \xrightarrow{\Delta} KCl + ICl$ (high lattice E)

not $KI + Cl_2$ ✗ (low LE)

Br_2 (Bromine)

prepr

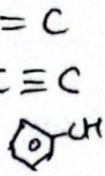
Aq. $MgBr_2 \xrightarrow{Cl_2} Br_2 + MgCl_2$.

$\downarrow I_2$ (cant displ.)

No rxn.

aq. $MgCl_2 \xrightarrow{Br_2}$ No rxn.

use: Detection of unsaturation.

C=C, C≡C,  $\xrightarrow[CCl_4]{Br_2 \text{ (reddish brown)}}$ colorless

but  $\xrightarrow[\text{reddish brown}]{Br_2}$ does not disappear color

I_2

prepr

$I^- + \begin{Bmatrix} MnO_2 \\ KMnO_4 \\ K_2Cr_2O_7 \end{Bmatrix}$ (O.A.) $\longrightarrow I_2$.

source :- see weed → brown algae.

↓ dry burn

Kelp

→ Caliche – chile salt petre
↳ $NaNO_3 + NaIO_3$
↳ small amt मा

use : Iodised salt ($NaCl + \underset{KI+KIO_3}{I_2}$) खाना लाई

→ Tincture iodine → used as antiseptic
↓
$I_2 + KI$ + alcohol

properties
→ color → dark voilet
→ molecular solid.
– Iodine shows slighty metallic character.

Q. Iodine forms:–
(a) I^+ (b) I^{+3} (c) I^- (d) All

→ Iodine is less soluble in H_2O because I_2 is covalent (not pol

Note: Solubility of I_2 ↑ in H_2O in presence of KI due to polyhalide formation.

$$I_2 + KI \longrightarrow \overset{+}{K}\overset{-}{I_3}$$

→ spot of Iodine from fabric remove by Hypo solution. beca hypo convert colored I_2 to colorless NaI

★ $I_2 + \underset{+2}{Na_2S_2O_3} \longrightarrow \underset{+2.5}{Na_2S_4O_6} + NaI$
voilet (O.A)
sod. thiosulphate
sod. tetrathionate
↳ colorless.

$I_2 + NH_3(aq) \longrightarrow$ No rxn

but $I_2 + NH_3(aq) \longrightarrow NH_3.NI_3$
explosive.

Q. Chemical formula of caliche:–
(a) $NaNO_3$ (b) K_2CO_3 (c) $CaOCl_2$ (d) $CaCl_2$

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Q. Iodine can be prepared by treating on iodide with:-
(a) H_2SO_4 (b) $H_2SO_4 + MnO_2$ (c) $H_2SO_4 + NaNO_3$ (d) All of these

Q. A salt, which on heating with conc. H_2SO_4 give voilet vapor
(a) Iodide (b) Nitrate (c) Sulphide (d) Bromide

Q. Iodine defieciency in diet leads to:-
(a) Beriberi (b) Goitre (c) Night blindness (d) Rickets

Q. Tincture of iodine contains:-
(a) I_2, KI & rectified spirit (b) I_2 & rectified spirit
(c) KI & rectified sprit (d) I_2 & water

Q. Which one of the following salts are used for preparation of iodized salt?
(a) (I) KIO_3 (II) KI (III) I_2 (IV) HI
(a) I & II (b) I & III (c) II & IV (d) III & IV

Q. Solid iodine is:-
(a) Ionic (b) covalent (c) molecular (d) Metallic.

Q. Iodine is soluble in water in presence of:-
(a) NaI (b) KI (c) I^- (d) All

Q. The solubility of iodine in water is increased, if it is mixed with:-
(a) Alcohol (b) Chloroform (c) Sodium hydroxide
(d) Potassium iodide (KI)

Q. If I_2 is dissolved in aq. KI, the intense yellow color I_3^- is formed. The str. of I_3^- ion is:-
(a) square pyramidal (b) trigonal bipyramidal sp^3d.
(c) Octahedral (d) Pentagonal bipyramidal

Q. Aq. solution of $Na_2S_2O_3$ on rxn with Cl_2 gives :-
(a) $Na_2S_4O_6$ (I_2 लगा) (b) $NaHSO_4$ (c) NaCl (d) NaOH

Q. When thiosulphate ion is oxidized by iodine, which one of the following ion is produced?
(a) SO_3^{2-} (b) SO_4^{2-} (c) $S_4O_6^{2-}$ (d) $S_2O_6^{2-}$

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Q. Color of iodine solution is discharged by shaking it with the aq. solution of :-

(a) H_2SO_4 (b) sodium sulphide (c) Sod. thiosulphate (Hypo) (d) Sod. sulphate

Q. When I_2 is dissolved in CCl_4, the color that results is :-

(a) brown (b) violet (c) colorless (d) bluish green

Q. Iodine react with liq. NH_3 to give :-

(a) NH_4I & N_2 (b) NH_4I & HI

(c) NI_3 & N_2 (d) $NH_3 \cdot NI$ & HI

Q. The acid formed when iodine reacts with conc. HNO_3 is :-

(a) Hydriodic acid (b) Periodic acid

(c) Nitrous acid (d) Iodic acid (HIO_3)

Q. The acid which can oxidize iodine to iodic acid is :-

(a) Sulphuric acid (b) Oxalic acid

(c) Nitric acid (d) Acetic acid

Q. Which halogen is used as antiseptic?

(a) F_2 (b) Cl_2 (c) Br_2 (d) I_2

Q. HI can't be prepared by the action of conc. H_2SO_4 on KI bcz :-

(a) HI is stronger than H_2SO_4

(b) HI is more volatile than H_2SO_4

(c) H_2SO_4 is an oxidizing agent

(d) H_2SO_4 forms complex.

Q. Conc. HNO_3 reacts with I_2 to give :-

(a) HI (b) HOI (c) $HOIO_2$ (HIO_3) (d) $HOIO_3$

Q. Which of the following is most stable?

(a) HF (b) HCl (c) HBr (d) HI

Q. Which has the highest molar heat of vaporization?

(a) HF (b) HCl (lowest.) (c) HBr (d) HI

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Q. The correct order of acidic strength is :-

(a) $HF < HCl < HBr < HI$

(b) $HCl < HBr < HI < HF$

(c) $HBr < HCl < HI < HF$

(d) $HI < HBr < HCl < HF$

→ Q. correct order of acidic str:-

(a) $HClO_4 < HClO_3 < HClO_2 < HClO$

(b) $HClO_2 < HClO_3 < HClO_4 < HClO$

(c) $HClO_4 < HClO_3 < HClO_2 < HClO_4$

(d) $HClO < HClO_2 < HClO_3 < HClO_4$

Q. Which one has lowest melting point?

(a) HF (b) HCl (c) HBr (d) HF

Q. Which is most volatile compound?

(a) HI (b) HCl (c) HBr (d) HI

Q. The correct order of thermal stability of hydrogen hali

(a) $HI > HBr > HCl > HF$

(b) $HF > HCl > HBr > HI$

(c) $HCl > HF > HBr > HI$

(d) $HI > HCl > HI > HBr$

Q. Which of the following attacks glass?

(a) HCl (b) HF (c) HI (d) HBr

Q. Anhy. mixture of KF & HF contains which ions?

(a) K^+, HF_2^- (b) $(KF)^+ . (HF)^-$ $KHF_2 \rightarrow K^+ + HF_2^-$

(c) KH^+, F^- (d) $K^+ . H^+ . F^-$

Q. Which has maximum vapour pressure?

(a) HCl (b) HF (c) HI (d) HBr

Q. Which one of the halogen acids is a liquid?

(a) HF (b) HCl (c) HBr (d) HI

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Q. Which of the hydrohalic acid is inexpensive, strong and stable against oxidation?

(a) HF (b) HCl (c) HBr (d) HI

Q. Among the halogens, which is oxidized by nitric acid;—

(a) F (b) Cl (c) Br (d) I

Q. The acid employed for etching glass is:—

(a) H_2SO_4 (b) $HClO_4$ (c) HF (d) Aqua regia

Q. HF is not kept inside:—

(a) glass bottle (b) plastic bottle (c) iron bottle (d) Tin bottle

Q. Which of the following is halous acid?

(a) HOX (b) HXO_2 (c) HXO_3 (d) HXO_4

Q. The type of hybrid orbitals used by chlorine atom in ClO_2^- is:—

(a) sp^3 (b) sp^2 (c) sp (d) None

Q. Calcium chlorite is:—

(a) CaClO (b) $Ca(ClO_4)_2$ (c) $Ca(ClO_3)_2$ (d) $Ca(ClO_2)_2$

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