

# Halogen Group - 17

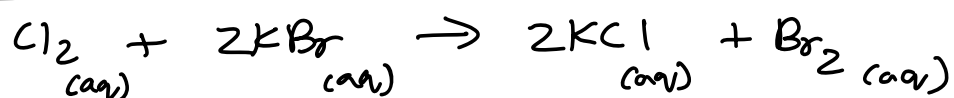
Name of the Halogen	Physical state at rtp	Color
Fluorine	gas	yellow
Chlorine	gas	green
Bromine	liquid	orange / red / brown
Iodine	solid	Black / grey
Astatine	solid	Shiny black / black

$F_2$ $Cl_2$ $Br_2$ $I_2$ $At_2$	$\ominus$ Reactivity decrease $\ominus$ Density increase $\ominus$ m.p increase $\ominus$ color becomes darker $\checkmark \ominus$ oxidising power decrease $\ominus$ Electronegativity decrease.
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Displacement Reaction:-

More reactive halogen can displace a less reactive halogen from a compound.

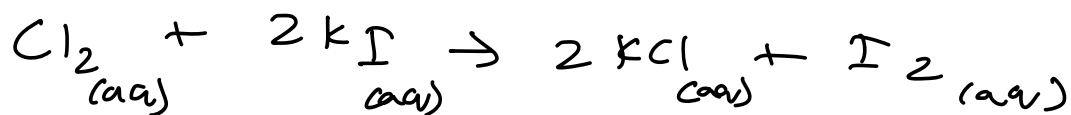
Example:



Observation

colorless solution turns red brown

Ionic equation



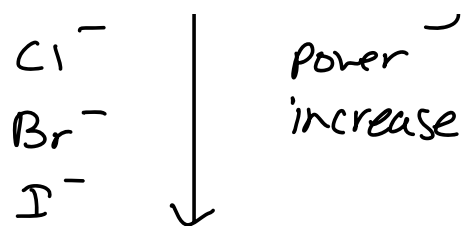
Observations: colorless solution, turns brown.

Ionic equation



Halides

$\text{F}^-$  | Reducing



⊖ Ionic radius increase

⊖ Attraction between nucleus and the outermost shell electron decrease.

⊖ Easy to donate electrons.

## Identification of Halides



### Chloride

Test : Add dilute  $\text{HNO}_3$  } Add acidified  
 Add  $\text{AgNO}_3 (\text{aq})$  }  $\text{AgNO}_3 (\text{aq})$

Observation : white precipitate is formed.

⊖ white ppt dissolves in dilute ammonia

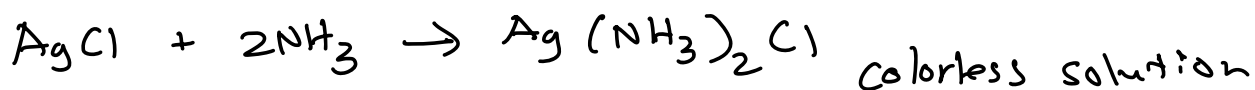
⊖ white ppt dissolves in concentr.  $\text{NH}_3$ .

### Reaction

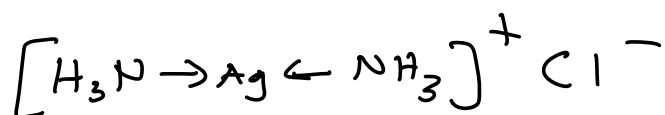


Ionic equation:  $\text{Ag}^+_{(aq)} + \text{Cl}^-_{(aq)} \rightarrow \text{AgCl}_{(s)}$

Reaction of AgCl with dilute ammonia



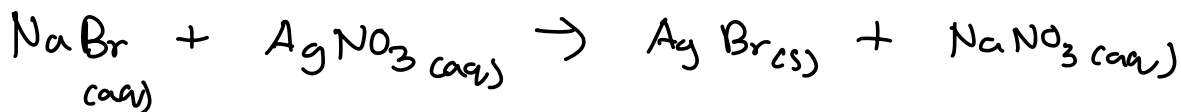
$\text{NH}_3$  is  
a ligand



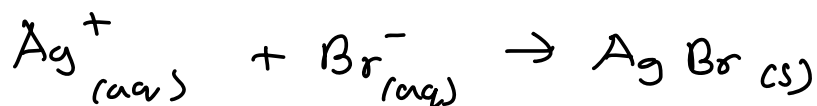
Bromide ( $\text{Br}^-$ )

Test: Add dilute  $\text{HNO}_3$   
Add  $\text{AgNO}_3_{(aq)}$

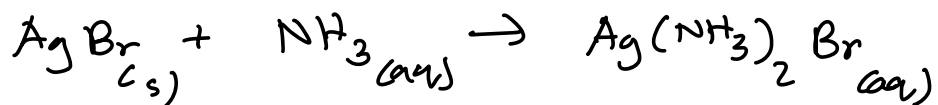
Observation: Cream color ppt is formed.  
ppt is insoluble in dilute ammonia  
but soluble in concent.  $\text{NH}_3$ .



Ionic solution



## Reactions of Ag Br with concentr. $\text{NH}_3$



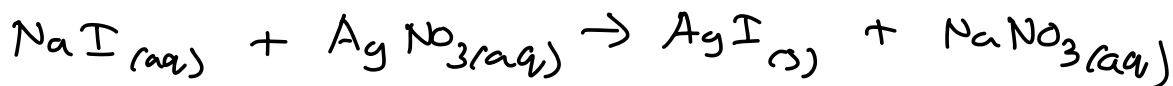
## Iodide ( $\text{I}^-$ )

Test     Add dilute  $\text{HNO}_3$   
           Add aq  $\text{AgNO}_3$

Observation     Yellow ppt is formed

Yellow ppt is insoluble in dilute ammonia and concentr.  $\text{NH}_3$ .

Reaction:



Reactions of the metal halides with  
concent.  $\text{H}_2\text{SO}_4$

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Reactions of sodium chloride with conc.  $\text{H}_2\text{SO}_4$

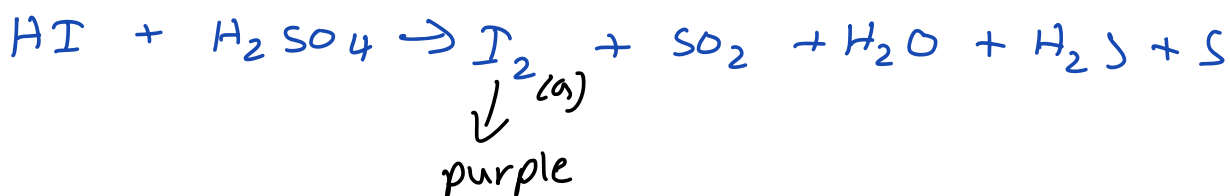




### Reaction of NaBr with concentr. $\text{H}_2\text{SO}_4$



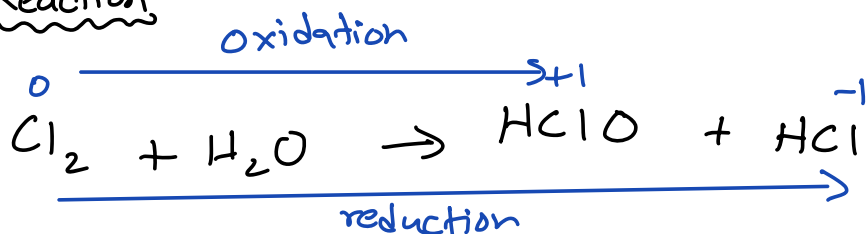
### Reaction of NaI with concentr. $\text{H}_2\text{SO}_4$



### Chlorination of water

- ⊖ Adding a small amount of chlorine to a water supply will kill bacteria and make the water safe to drink.

Reaction

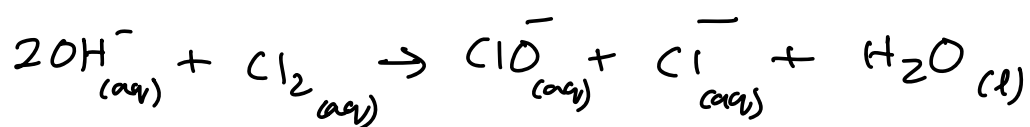
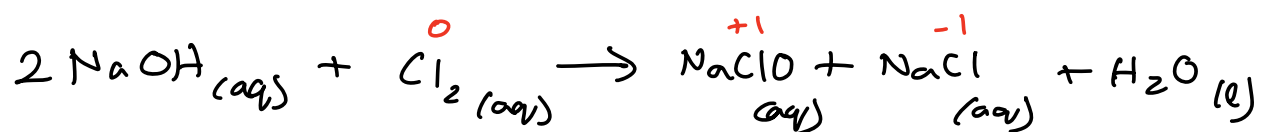


⊖  $\text{HClO}$  is called chloric (I) acid.

⊖  $\text{HClO}$  sterilise water by killing bacteria.

Reaction of chlorine with cold aqueous  $\text{NaOH}$

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Reaction of chlorine with hot aqueous  $\text{NaOH}$

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