

Chemical Properties of Halogen

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Chemical Properties

- ▶ **Oxidizing Agent and Reducing Agent**
- ▶ **Displacement Reaction**
- ▶ **Bleaching Agent**
- ▶ **Reaction with Chlorine Water**

1. Oxidizing Agent & Reducing Agent


Halogens	Atomic Size	Attraction	Ability to Gain electron (Oxidizing Power)	Ability to Lose electron (Reducing Power)	Q1. Tick the Most Powerful Oxidizing Agent	Q2. Tick the Most Powerful Reducing Agent
Fluorine	I n c r e a s e s ↓	D e c r e a s e s ↓	D e c r e a s e s ↓	I n c r e a s e s ↓		
Chlorine						
Bromine						
Iodine						

1. Oxidizing Agent & Reducing Agent

Halogens	Atomic Size	Attraction	Ability to Gain electron (Oxidizing Power)	Ability to Lose electron (Reducing Power)	Q1. Tick the Most Powerful Oxidizing Agent	Q2. Tick the Most Powerful Reducing Agent
Fluorine	I n c r e a s e s ↓	D e c r e a s e s ↓	D e c r e a s e s ↓	I n c r e a s e s ↓	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Chlorine					<input type="checkbox"/>	<input type="checkbox"/>
Bromine					<input type="checkbox"/>	<input type="checkbox"/>
Iodine					<input type="checkbox"/>	<input checked="" type="checkbox"/>

2. Displacement Reaction

- ▶ The halogen at the top will displace the halogen ion below it.
- ▶ Halogen at the top are more reactive and halogen at the bottom is least reactive.

Halogens	Reactivity
Fluorine	 <p>Decreases</p>
Chlorine	
Bromine	
Iodine	

2. Displacement Reaction



- ▶ In the above reaction, there are two halogen chlorine and bromine.
- ▶ We know that **chlorine** is more **reactive** than **bromine**.
- ▶ Hence, **Chlorine** displaces **Bromine** from **KBr** with the production of bromine.

Q3. Which of the ⁶ following reaction is feasible? Why?



3. Bleaching Agent

- ▶ Halogen is used as bleaching agent to **remove coloured matter**.
- ▶ In the bleaching action of chlorine, it is due to the **oxidation** of coloured matter

(You may refer page number 117 for the raw jute bleaching)

- ▶ **Oxidation:**
- ▶ It is also defined as the **process of adding oxygen**.

3. Bleaching Agent

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Mechanism of Bleaching Action of Chlorine Step 1

▶ Water combines with chlorine to forms chlorine water

• Chlorine water contains **TWO acids**

(Hydrochloric acid: HCl

and hypochlorous acid: HClO)



3. Bleaching Agent

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Mechanism of Bleaching Action of Chlorine Step 2

▶ HClO is unstable

- So, to become stable it **decomposes** to give hydrochloric acid (HCl) and **nascent oxygen** [O]



3. Bleaching Agent

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Mechanism of Bleaching Action of Chlorine Step 3

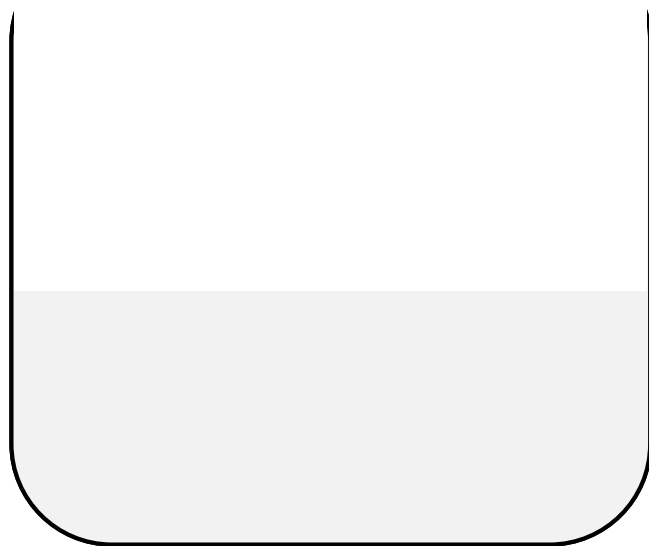
- ▶ Nascent oxygen **oxidises** the coloured matter to a **colourless matter** and the process is known as **bleaching**.
 - ▶ Coloured matter + [O] → Colourless compound

4. Reaction with Chlorine Water

- ▶ Chlorine water contains two acids
 - *Hydrochloric acid: HCl and*
 - *Hypochlorous acid: HClO*

4. Reaction with Chlorine Water: **ACTIVITY**

► Step 1: Addition of Chlorine in Water

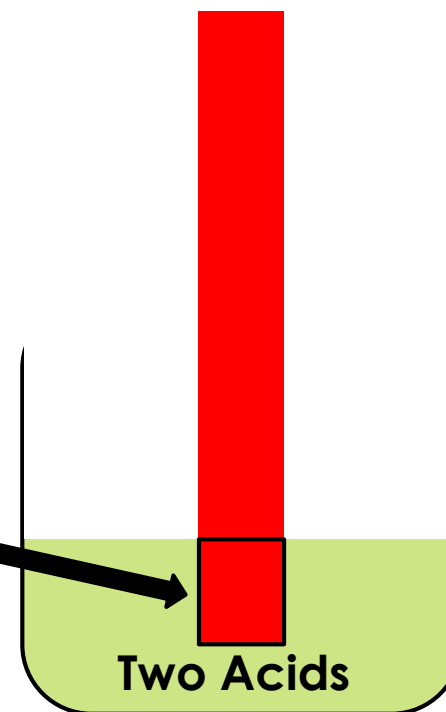


Q1. Name the TWO acids:

4. Reaction with Chlorine Water: **ACTIVITY**

► Step 2: Litmus Test

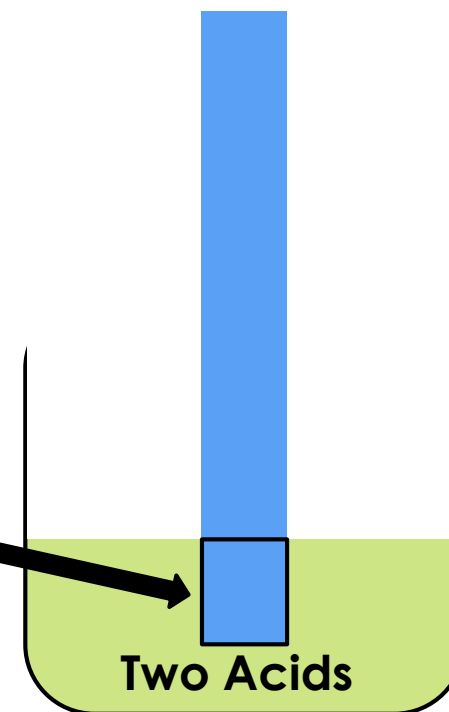
Q2. Will the litmus colour change?



4. Reaction with Chlorine Water: **ACTIVITY**

► Step 2: Litmus Test

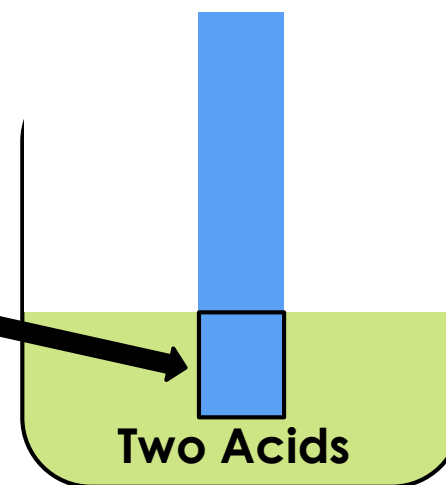
Q3. Will the litmus colour change?



4. Reaction with Chlorine Water: **ACTIVITY**

► Step 3: Reaction

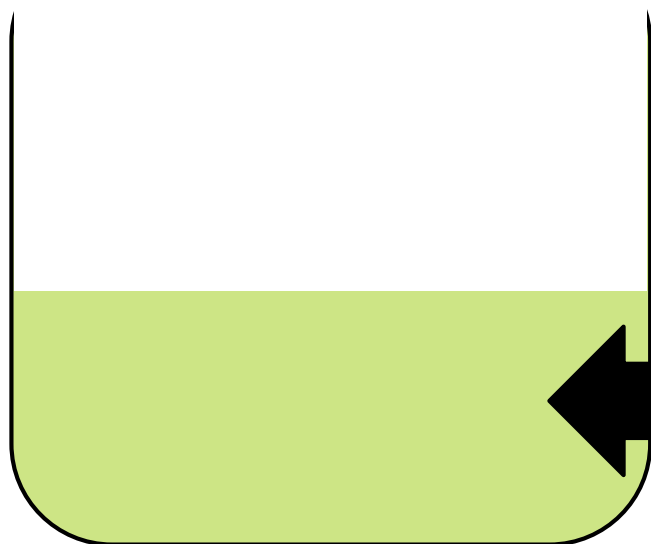
Q4. What happens to the colour of the litmus paper?



ANSWER

4. Reaction with Chlorine Water: **ACTIVITY**

► Step 1: Addition of Chlorine in Water



Q1. Name the TWO acids:

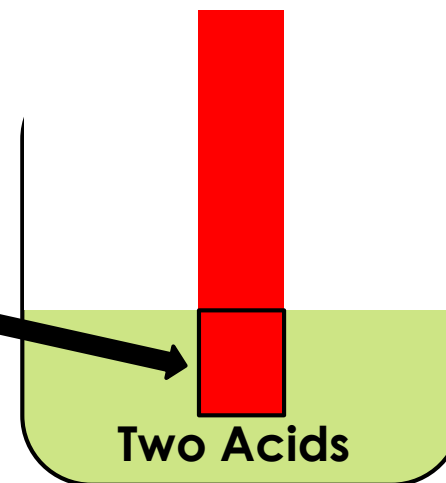
**Hypochlorous Acid
and Hydrochloric Acid**

4. Reaction with Chlorine Water: **ACTIVITY**

► Step 2: Litmus Test

Q2. Will the litmus colour change?

NO

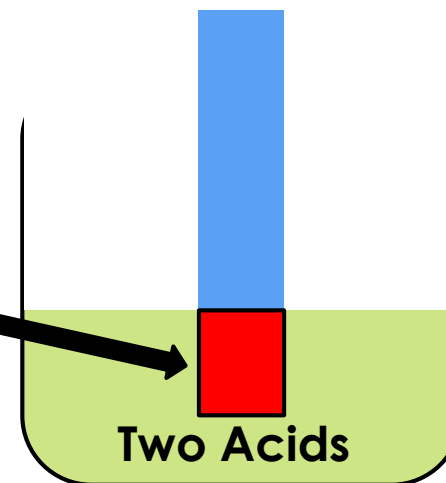


4. Reaction with Chlorine Water: **ACTIVITY**

► Step 2: Litmus Test

Q3. Will the litmus colour change?

YES



4. Reaction with Chlorine Water: **ACTIVITY**

► Step 3: Reaction

Q4. What happens to the colour of the litmus paper?

The litmus colour
DECOLORISES or becomes
COLOURLESS

