



CHEMISTRY ONLINE
— **TUITION** —

Phone: +442081445350

www.chemistryonlinetuition.com

Email: asherrana@chemistryonlinetuition.com

CHEMISTRY

INORGANIC CHEMISTRY

Level & Board

AQA (A-LEVEL)

TOPIC:

GROUP 7 HALOGEN

PAPER TYPE:

SOLUTION - 4

TOTAL QUESTIONS

10

TOTAL MARKS

46

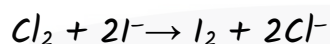
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Group 7 the Halogens - 4

1.

(a)

i.



(1)

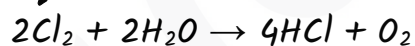
ii.

Observation: Solution from colourless to changes brown / red-brown solution.

(1)

(b)

Equation



(1)

(c)

Chlorine (Cl_2) has a lower boiling point than bromine (Br_2) due to:
Relative Size : Chlorine is smaller than bromine. So it has weaker intermolecular forces

Effect on Intermolecular Forces: Weaker forces between chlorine molecules result in less energy needed to separate them.

(2)

2. c

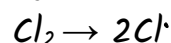
(1)

3.

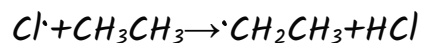
(a)

Initiation Step:

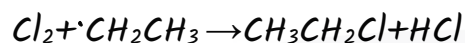
UV light



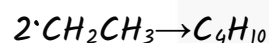
First Propagation Step:



Second Propagation Step:



Termination Step (producing butane):



(4)

(b)

One essential condition:

ultra-violet /sun light OR high temperature

Mechanism: (free-)radical substitution

(2)

4. D

(1)

5.

(a)

Trend: The electronegativity decreases down Group VII.

Explanation:

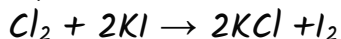
The electronegativity decreases down Group due to as number of shells increases or atomic radius increases so less attraction for bond (pair of electrons) is observed.

(3)

(b)

Observation when chlorine gas is bubbled into an aqueous solution of potassium iodide: brown solution or it is black solid

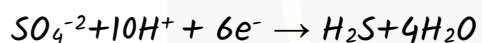
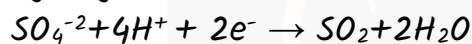
Equation:



(2)

(c)

When concentrated sulfuric acid oxidizes iodide ions, two sulfur-containing reduction products are formed: sulfur dioxide (SO_2) and hydrogen sulfide (H_2S).



(4)

(d)



Oxidation state of chlorine in:

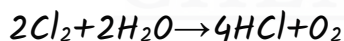
Sodium chloride: -1

Sodium chlorate(I) (or bleach etc): +1

(5)

6.

Equation for the Reaction of Chlorine with Water in Sunlight:



Name of the White Precipitate:

silver Chloride (AgCl)

Observation when Excess Aqueous Ammonia is Added to the White Precipitate:
The solid/precipitate dissolves and forms a (colourless) solution.

(3)

7.

(a)

The three reduction products and give the oxidation state of sulphur

Sulfur Dioxide:

Oxidation State of Sulfur: +4

Elemental Sulfur (Sulfur):

Oxidation State of Sulfur: 0

Hydrogen Sulfide:

Oxidation State of Sulfur: -2

(3)

(b)

Observations:

Sulfur Dioxide (SO₂):

Observation: Sulfur dioxide is a choking gas or has a pungent odor.

Elemental Sulfur (Sulfur):

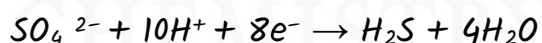
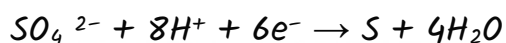
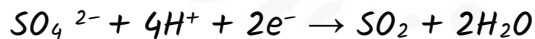
Observation: Sulfur is a yellow solid.

Hydrogen Sulfide (H₂S):

Observation: Hydrogen sulfide has a smell of bad eggs.

(4)

(c)



(3)

8. A

(1)

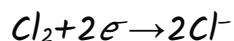
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9.

Reducing Agent:

A reducing agent is an electron donor. So a reducing agent is a substance that undergoes oxidation and, in the process, donates electrons to another substance. It is an electron donor. In a chemical reaction, the reducing agent itself gets oxidized, leading to the reduction of the other substance.

Deduction of Half-Equation for Chlorine to Chloride Ions:



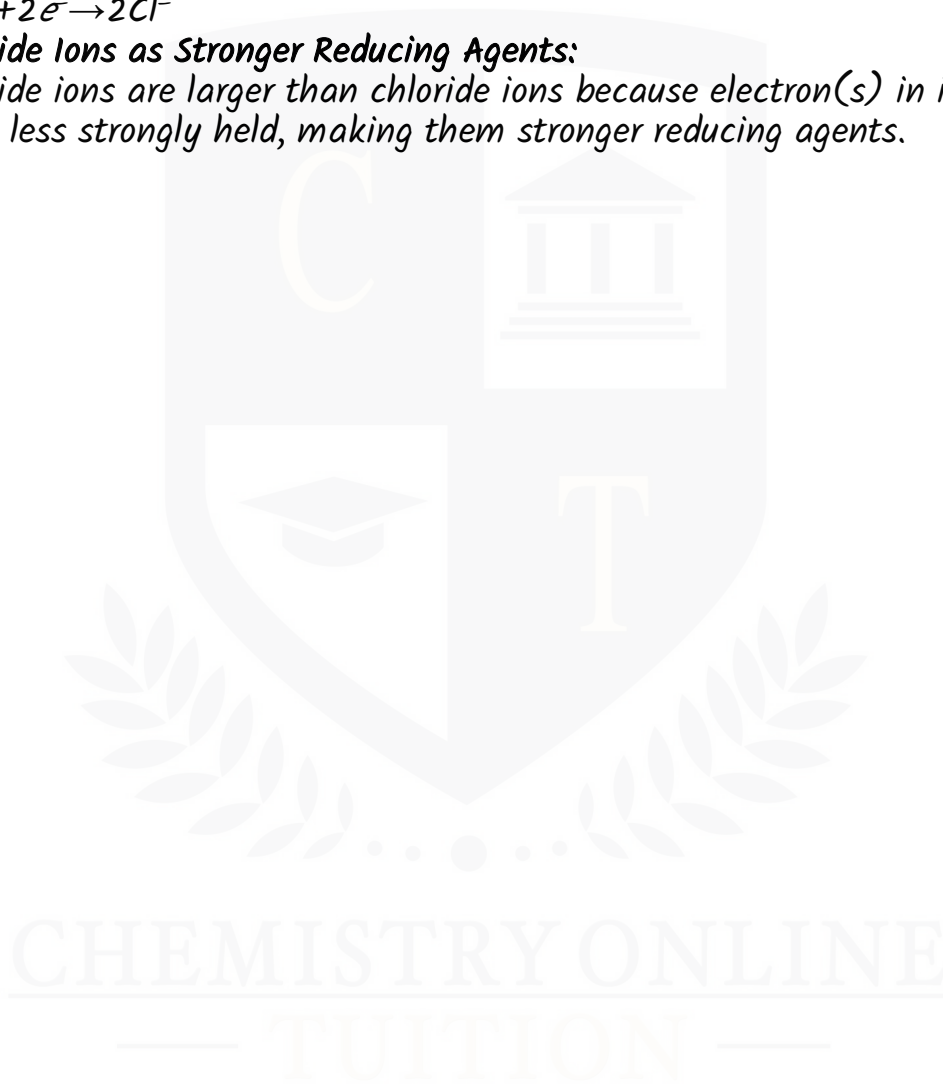
Iodide Ions as Stronger Reducing Agents:

Iodide ions are larger than chloride ions because electron(s) in iodide ions are less strongly held, making them stronger reducing agents.

(4)

10. C

(1)



I am Sorry !!!!!



DR. ASHAR RANA
M.B.B.S / MS. CHEMISTRY



- Founder & CEO of Chemistry Online Tuition Ltd.
- Completed Medicine (M.B.B.S) in 2007
- Tutoring students in UK and worldwide since 2008
- CIE & EDEXCEL Examiner since 2015
- Chemistry, Physics, Math's and Biology Tutor

CONTACT INFORMATION FOR **CHEMISTRY ONLINE TUITION**

- UK Contact: 02081445350
- International Phone/WhatsApp: 00442081445350
- Website: www.chemistryonlinetuition.com
- Email: asherrana@chemistryonlinetuition.com

Address: 210-Old Brompton Road, London SW5 OBS, UK