



**CHEMISTRY ONLINE**  
— **TUITION** —

Phone: +442081445350

[www.chemistryonlinetuition.com](http://www.chemistryonlinetuition.com)

Email: [asherrana@chemistryonlinetuition.com](mailto:asherrana@chemistryonlinetuition.com)

# CHEMISTRY

## INORGANIC CHEMISTRY

|                 |                    |
|-----------------|--------------------|
| Level & Board   | AQA (A-LEVEL)      |
| TOPIC:          | GROUP 7 HALOGEN    |
| PAPER TYPE:     | QUESTION PAPER - 3 |
| TOTAL QUESTIONS | 10                 |
| TOTAL MARKS     | 35                 |

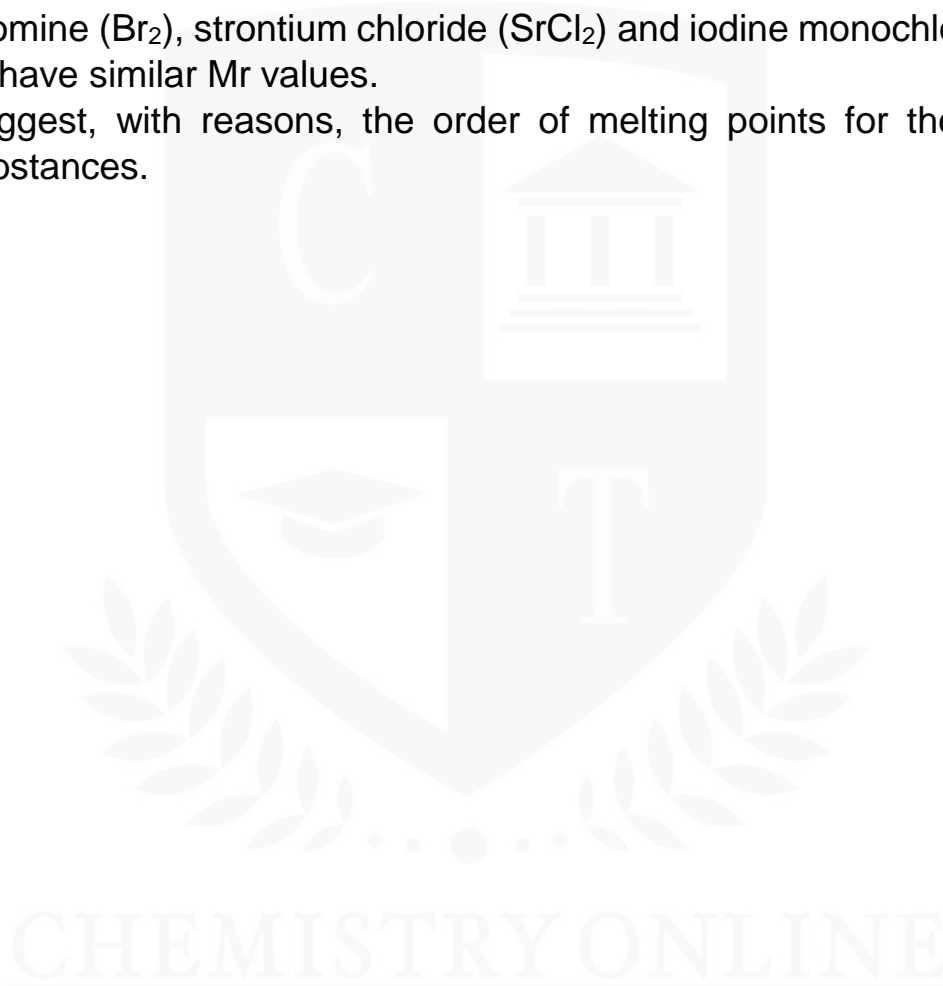
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## Group 7 the Halogens - 3

1. This question is about elements in Group 7 of the Periodic Table and their compounds.

**(a)** Bromine ( $\text{Br}_2$ ), strontium chloride ( $\text{SrCl}_2$ ) and iodine monochloride ( $\text{ICl}$ ) all have similar Mr values.

Suggest, with reasons, the order of melting points for these three substances.



**(6)**

**(b)** Write an equation for the reaction of chlorine with cold water.

State a reason why chlorine is added to drinking water, and suggest a disadvantage of treating water in this way.

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(3)

2. Which statement is not correct about the trends in properties of the hydrogen halides from HCl to HI ?

- A. The boiling points decrease.
- B. The bond dissociation energy of H-X decreases.
- C. The polarity of the H-X bond decreases.
- D. They are more easily oxidised in aqueous solutions.

(1)

3. This question is about the chemical properties of chlorine, sodium chloride and sodium bromide.

(a) Sodium bromide reacts with concentrated sulfuric acid in a different way from sodium chloride.

Write an equation for this reaction of sodium bromide and explain why bromide ions react differently from chloride ions.

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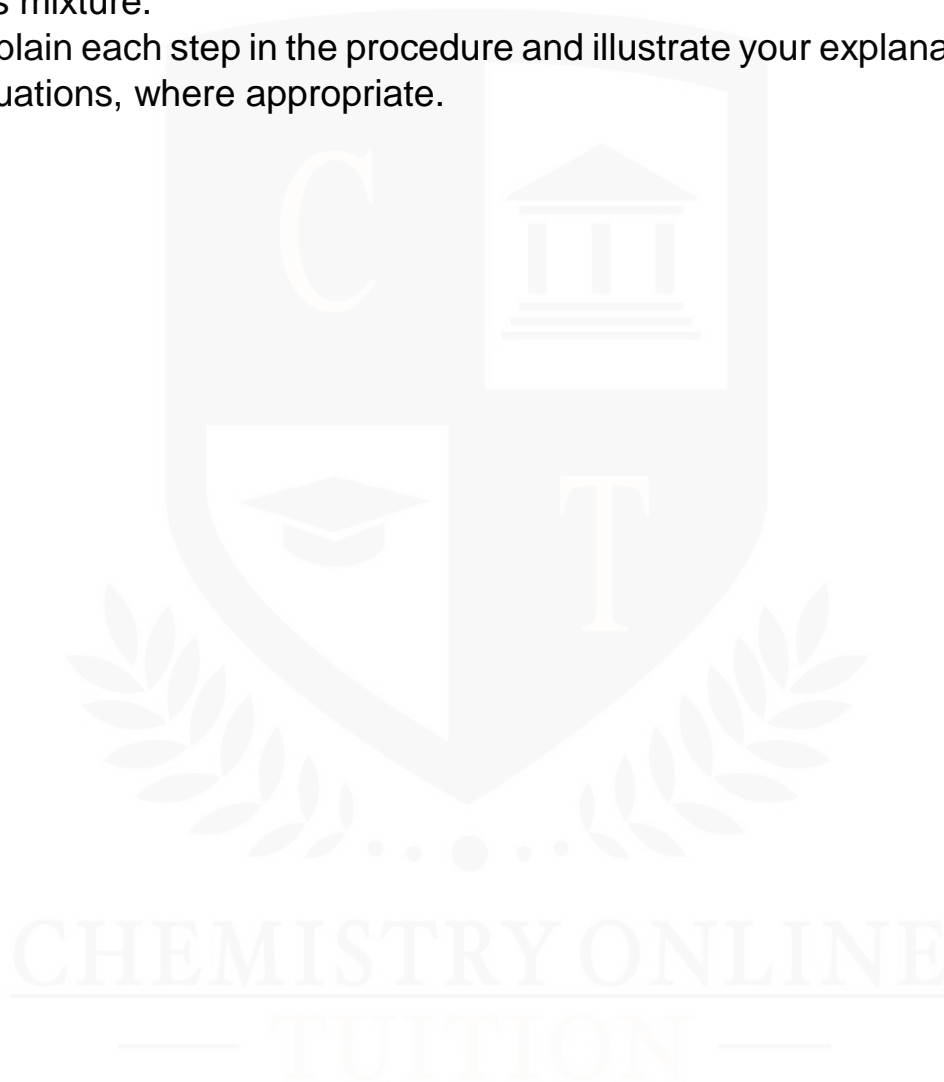
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(3)

**(b)** A colourless solution contains a mixture of sodium chloride and sodium bromide.

Using aqueous silver nitrate and any other reagents of your choice, develop a procedure to prepare a pure sample of silver bromide from this mixture.

Explain each step in the procedure and illustrate your explanations with equations, where appropriate.



(6)

**(c)** Write an ionic equation for the reaction between chlorine and cold dilute sodium hydroxide solution.

Give the oxidation state of chlorine in each of the chlorine-containing ions formed.

(2)

4. Which shows the major product(s) formed when chlorine reacts with cold, dilute, aqueous sodium hydroxide?
- A. NaCl only
  - B. NaClO only
  - C. NaCl and NaClO
  - D. NaCl and NaClO<sub>3</sub>

(1)

5. Aldehydes can be prepared from acyl chlorides. State how an aldehyde could be tested to show whether it is contaminated with traces of unreacted acyl chloride. State what you would observe.

(2)

6. Which species is not produced by a redox reaction between solid sodium iodide and concentrated sulfuric acid?

- A. Na<sub>2</sub>SO<sub>4</sub>
- B. H<sub>2</sub>S
- C. S

**D. SO<sub>2</sub>**

**(1)**

7. A student completes an experiment to determine the percentage by mass of sodium chloride in a mixture of sodium chloride and sodium iodide.

The student uses this method.

- 600 mg of the mixture are dissolved in water to form a solution.
- An excess of aqueous silver nitrate is added to the solution.

This forms a precipitate containing silver chloride and silver iodide.

- Excess dilute ammonia solution is then added to the precipitate.

The silver chloride dissolves.

- The silver iodide is filtered off from the solution, and is then washed and dried.

The mass of the silver iodide obtained is 315 mg

**(a)** Silver nitrate is added to the solution.

Suggest why an excess is used.

**(1)**

**(b)** Calculate the amount, in moles, of silver iodide obtained.

Mr (AgI) = 234.8

**(1)**

**(c)** Calculate, using your answer to part (b), the mass, in grams, of sodium iodide in the mixture.

Mr (NaI) = 149.9

**(1)**

**(d)** Calculate, using your answer to part (c), the percentage by mass of sodium chloride in the mixture.

**(2)**

**8.** What is the best oxidising agent?

- A.**  $F_2$
- B.**  $F^-$
- C.**  $I_2$
- D.**  $I^-$

**(1)**

**9.** The presence of halide ions in solution can be detected by adding silver nitrate solution and dilute nitric acid.

**(a)** State the purpose of the nitric acid in this test.

**(1)**

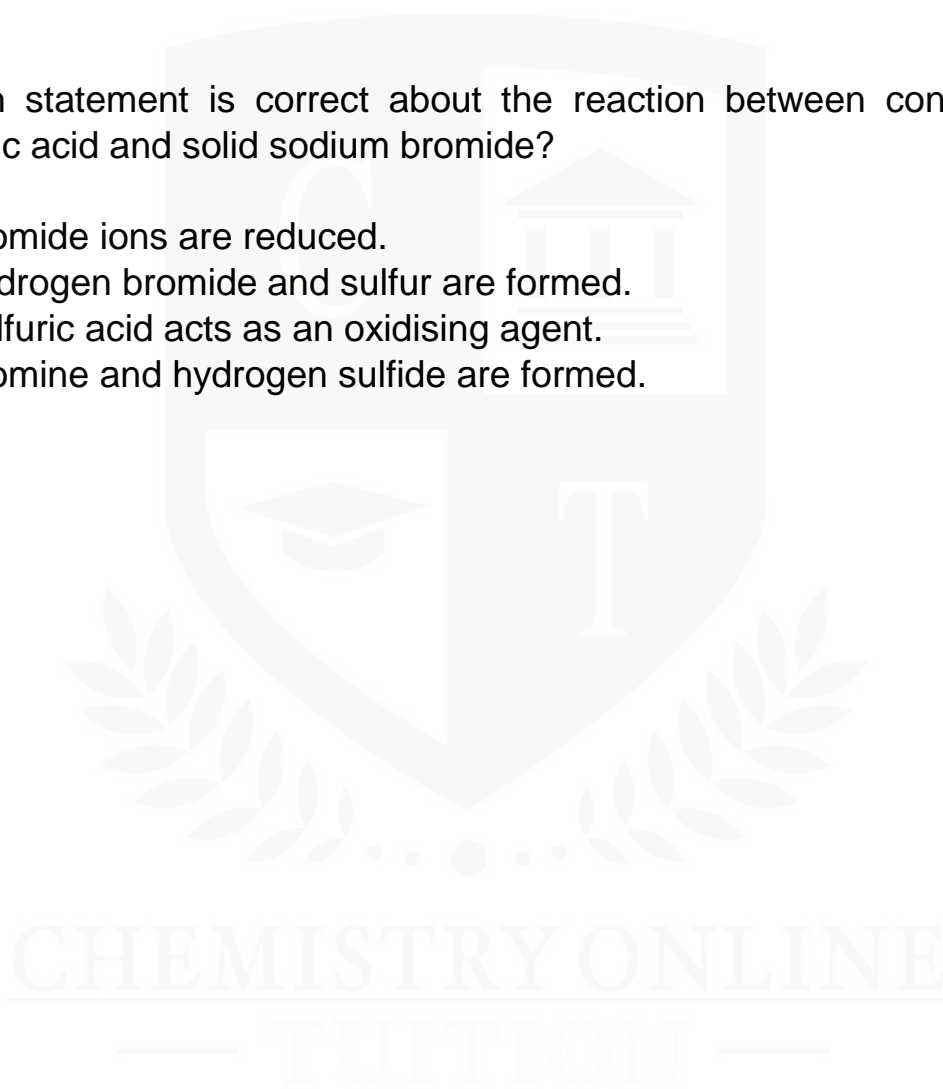
**(b)** Explain how the addition of an ammonia solution can be used to confirm that a precipitate is silver bromide.

**(2)**

**10.** Which statement is correct about the reaction between concentrated sulfuric acid and solid sodium bromide?

- A.** Bromide ions are reduced.
- B.** Hydrogen bromide and sulfur are formed.
- C.** Sulfuric acid acts as an oxidising agent.
- D.** Bromine and hydrogen sulfide are formed.

**(1)**

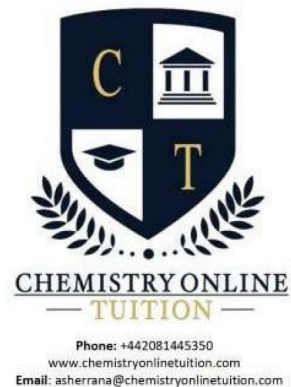


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**DR. ASHAR RANA**  
M.B.B.S / MS. CHEMISTRY



- 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

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## CONTACT INFORMATION FOR CHEMISTRY ONLINE TUITION

- UK Contact: 02081445350
  - International Phone/WhatsApp: 00442081445350
  - Website: [www.chemistryonlinetuition.com](http://www.chemistryonlinetuition.com)
  - Email: [asherrana@chemistryonlinetuition.com](mailto:asherrana@chemistryonlinetuition.com)
- Address: 210-Old Brompton Road, London SW5 OBS, UK