

**AQA – Oxidation, reduction and redox equations – A2 Chemistry P1**

## 1. June/ 2020/Paper\_1/No.8

0	8
---	---

A student does an experiment to determine the percentage by mass of sodium chlorate(I), NaClO, in a sample of bleach solution.

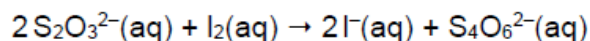
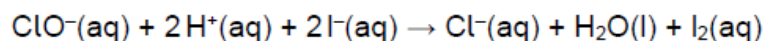
Method:

- Dilute a 10.0 cm<sup>3</sup> sample of bleach solution to 100 cm<sup>3</sup> with distilled water.
- Transfer 25.0 cm<sup>3</sup> of the diluted bleach solution to a conical flask and acidify using sulfuric acid.
- Add excess potassium iodide to the conical flask to form a brown solution containing I<sub>2</sub>(aq).
- Add 0.100 mol dm<sup>-3</sup> sodium thiosulfate solution (Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub>) to the conical flask from a burette until the brown solution containing I<sub>2</sub>(aq) becomes a colourless solution containing I<sup>-</sup>(aq).

The student uses 33.50 cm<sup>3</sup> of sodium thiosulfate solution.

The density of the original bleach solution is 1.20 g cm<sup>-3</sup>

The equations for the reactions in this experiment are



- 0 8 . 1 Use all the information given to calculate the percentage by mass of NaClO in the original bleach solution.

Give your answer to 3 significant figures.

[7 marks]

Percentage by mass \_\_\_\_\_

- 0 8 . 2 The total uncertainty from two readings and an end point error in using a burette is  $\pm 0.15 \text{ cm}^3$

What is the total percentage uncertainty in using the burette in this experiment?

[1 mark]

Tick (✓) **one** box.

0.45%

0.90%

1.34%

## 2. June/ 2020/Paper\_1/No.9

0 9

This question is about sodium halides.

0 9 . 1

State what is observed when silver nitrate solution is added to sodium fluoride solution.

[1 mark]

0 9 . 2

State **one** observation when solid sodium chloride reacts with concentrated sulfuric acid.

Give an equation for the reaction.

State the role of the chloride ions in the reaction.

[3 marks]

Observation \_\_\_\_\_

Equation  
\_\_\_\_\_

Role \_\_\_\_\_

0 9 . 3

Give an equation for the redox reaction between solid sodium bromide and concentrated sulfuric acid.

Explain, using oxidation states, why this is a redox reaction.

[3 marks]

Equation  
\_\_\_\_\_Explanation \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

0 9 . 4 State what is observed when aqueous chlorine is added to sodium bromide solution.

Give an ionic equation for the reaction.

[2 marks]

Observation \_\_\_\_\_

Ionic equation

\_\_\_\_\_

## 3. June/ 2019/Paper\_1/No.5

0 5 . 4 State, in terms of redox, what happens to chlorine in the reaction in Question 05.3. [1 mark]

---



---

0 5 . 5 Solution Y contains **two** different negative ions.

To a sample of solution Y in a test tube a student adds

- silver nitrate solution
- then an excess of dilute nitric acid
- finally an excess of concentrated ammonia solution.

The observations after each addition are recorded in **Table 3**.

**Table 3**

Reagent added to solution Y	Observation
silver nitrate solution	cream precipitate containing compound <b>D</b> and compound <b>E</b>
excess dilute nitric acid	cream precipitate <b>D</b> and bubbles of gas <b>F</b>
excess concentrated ammonia solution	colourless solution containing complex ion <b>G</b>

Give the formulas of **D**, **E** and **F**.

Give an **ionic** equation to show the formation of **E**.

Give an equation to show the conversion of **D** into **G**.

[6 marks]

Formula of **D** \_\_\_\_\_

Formula of **E** \_\_\_\_\_

Formula of **F** \_\_\_\_\_

Ionic equation to form **E**  
 \_\_\_\_\_

Equation to show the conversion of **D** into **G**  
 \_\_\_\_\_

## 4. June/ 2019/Paper\_1/No.6

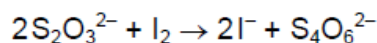
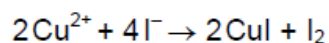
0 6

A student does an experiment to determine the percentage of copper in an alloy.

The student

- reacts 985 mg of the alloy with concentrated nitric acid to form a solution (all of the copper in the alloy reacts to form aqueous copper(II) ions)
- pours the solution into a volumetric flask and makes the volume up to 250 cm<sup>3</sup> with distilled water
- shakes the flask thoroughly
- transfers 25.0 cm<sup>3</sup> of the solution into a conical flask and adds an excess of potassium iodide
- uses exactly 9.00 cm<sup>3</sup> of 0.0800 mol dm<sup>-3</sup> sodium thiosulfate (Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub>) solution to react with all the iodine produced.

The equations for the reactions are



0 6 . 1

Calculate the percentage of copper by mass in the alloy.

Give your answer to the appropriate number of significant figures.

**[6 marks]**

% copper \_\_\_\_\_

**0 6 . 2** Suggest **two** ways that the student could reduce the percentage uncertainty in the measurement of the volume of sodium thiosulfate solution, using the same apparatus as this experiment. **[2 marks]**

1 \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

2 \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**0 6 . 3** State the role of iodine in the reaction with sodium thiosulfate. **[1 mark]**

\_\_\_\_\_

**0 6 . 4** Give the full electron configuration of a copper(II) ion. **[1 mark]**

\_\_\_\_\_

**0 6 . 5** Copper(I) iodide is a white solid.  
Explain why copper(I) iodide is white. **[2 marks]**

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

0 6 . 6 Iodine vaporises easily.

Calculate the volume, in  $\text{cm}^3$ , that 5.00 g of iodine vapour occupies at  $185\text{ }^\circ\text{C}$  and 100 kPa

The gas constant  $R = 8.31\text{ J K}^{-1}\text{ mol}^{-1}$

Give your answer to 3 significant figures.

**[4 marks]**

Volume \_\_\_\_\_  $\text{cm}^3$