

**Oxidation, reduction and redox equations – AS 2022 Chemistry P1**

## 1. June/2022/Paper\_7404/1/No.6

0 6

Iodide ions can be oxidised to iodine using oxidising agents such as iodate(V) ions ( $\text{IO}_3^-$ ) and concentrated sulfuric acid.

0 6 . 1

State, in terms of electrons, the meaning of the term oxidising agent.

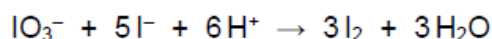
**[1 mark]**


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In acidic solution,  $\text{IO}_3^-$  ions oxidise iodide ions to iodine.



0 6 . 2

Give a half-equation for the oxidation of iodide ions to iodine.

Deduce the half-equation to show the reduction process in this reaction.

**[2 marks]**

Oxidation half-equation

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Reduction half-equation

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0 6 . 3

When iodide ions are oxidised using concentrated sulfuric acid, sulfur dioxide, a yellow solid and a foul-smelling gas are all formed.

Give an equation to show the reaction between iodide ions and concentrated sulfuric acid to form the yellow solid.

Identify the foul-smelling gas.

**[2 marks]**

Equation

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Identity of foul-smelling gas \_\_\_\_\_

## 2. June/2022/Paper\_7404/1/No.8

0 8

A student does two test-tube reactions on four colourless solutions (**A**, **B**, **C** and **D**).

Table 4 shows the student's observations.

Table 4

Solution	Test 1 Add Na <sub>2</sub> CO <sub>3</sub> (s)	Test 2 Add acidified AgNO <sub>3</sub> (aq)
<b>A</b>	Effervescence	No visible change
<b>B</b>	Effervescence	White precipitate
<b>C</b>	No visible change	No visible change
<b>D</b>	No visible change	Very pale yellow precipitate

0 8 . 1

Identify the gas formed in **Test 1**.

Describe a further test to confirm the identity of this gas.

[2 marks]

Identity of gas \_\_\_\_\_

Test

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0 8 . 2

Explain how the observations from **Test 1** and **Test 2** can be used to show that solution **B** contains hydrochloric acid.

[2 marks]

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0 8 . 3

Describe a series of tests that the student can use to show that solution **C** contains ammonium sulfate.

[4 marks]

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0 8 . 4

The student does an additional experiment to show that solution **D** contains a mixture of halide ions. One of the halide ions is chloride.

Method:

- Step 1 Add an excess of  $\text{AgNO}_3(\text{aq})$  to  $10.0 \text{ cm}^3$  of solution **D**.
- Step 2 Filter, wash, dry and weigh the precipitate.
- Step 3 Add an excess of dilute ammonia to the dry precipitate.
- Step 4 Filter, wash, dry and weigh the solid that remains.

Explain how the masses recorded during this experiment can be used to show that solution **D** contains a mixture of halide ions.

[2 marks]

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3. June/2022/Paper\_7404/1/No.19

In which of these substances is oxygen in the highest oxidation state?

[1 mark]

A  $\text{OF}_2$

B  $\text{H}_2\text{O}$

C  $\text{O}_2$

D  $\text{H}_2\text{O}_2$