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 (IO_3^-) and concentrated sulfuric acid.

0 6 . 1 State, in terms of electrons, the meaning of the term oxidising agent.

[1 mark]

In acidic solution, IO_3^- ions oxidise iodide ions to iodine.

$$IO_3^- + 5I^- + 6H^+ \rightarrow 3I_2 + 3H_2O$$

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

Reduction half-equation

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

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 $Na_2CO_3(s)$	**Test 2** Add acidified $AgNO_3(aq)$
A	Effervescence	No visible change
B	Effervescence	White precipitate
C	No visible change	No visible change
D	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

_____

_____

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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_____

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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]

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 $AgNO_3(aq)$ to 10.0 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]

3. June/2022/Paper_7404/1/No.19

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

[1 mark]

A OF_2 ⬭

B H_2O ⬭

C O_2 ⬭

D H_2O_2 ⬭