



Oxford Cambridge and RSA

## **A Level Chemistry A**

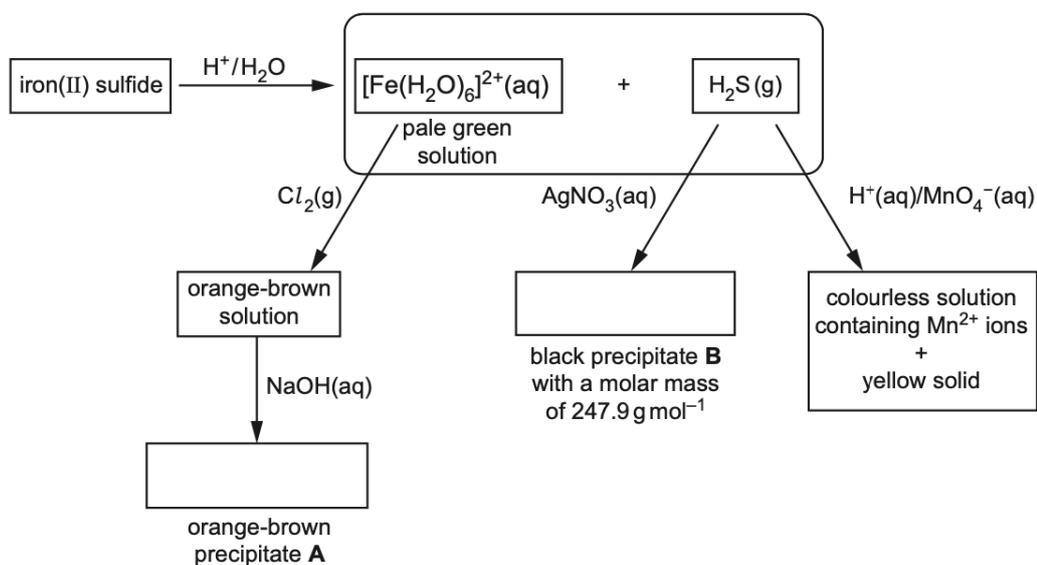
**H432/03** Unified chemistry

### **Question Set 17**

1

This question is about reactions of iron compounds.

(a) A student carries out the reactions in the flowchart, starting with iron(II) sulfide.



- (i) In the boxes, write the formulae of **A** and **B**. [2]
- (ii) The student thinks that the reaction of iron(II) sulfide with  $\text{H}^+/\text{H}_2\text{O}$  is a redox reaction.  
Explain, with reasons, whether the student is correct. [1]
- (iii) Write the equation for the reaction of  $[\text{Fe}(\text{H}_2\text{O})_6]^{2+}(\text{aq})$  with  $\text{Cl}_2(\text{g})$ . [1]
- (iv) Construct an equation for the reaction of  $\text{H}_2\text{S}(\text{g})$  with  $\text{H}^+(\text{aq})/\text{MnO}_4^-(\text{aq})$ . [2]

**(b)\*** Compound **C** is a hydrated ionic compound with the empirical formula:  
 $\text{FeH}_{18}\text{N}_3\text{O}_{18}$ .

A student investigates the thermal decomposition of compound **C** as outlined below.

**Stage 1**

The student gently heats 0.00300 mol of compound **C** to remove the water of crystallisation.

0.486 g of water is collected, leaving 0.00300 mol of the anhydrous compound **D**.

**Stage 2**

The student strongly heats 0.00300 mol of compound **D**, which decomposes to form a solid oxide **E** (molar mass of  $159.6 \text{ g mol}^{-1}$ ) and  $270 \text{ cm}^3$  of a gas mixture, measured at RTP, containing gases **F** and **G**.

**Stage 3**

The student cools the  $270 \text{ cm}^3$  gas mixture of **F** and **G**.

- Gas **F** is a compound that condenses to form 0.414 g of a liquid.
- Gas **G** remains and has a volume of  $54 \text{ cm}^3$ , measured at RTP.  
Gas **G** is tested and it relights a glowing splint.

Determine the formulae of **C**, **D**, **E**, **F** and **G**.

Show all your working and equations for the reactions.

**[6]**

**Total Marks for Question Set 17: 12**

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