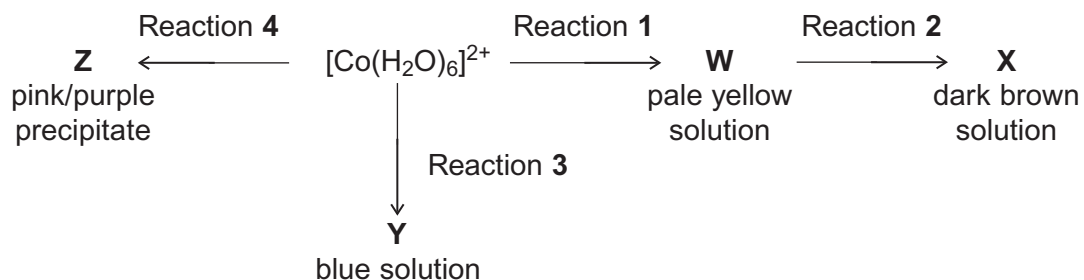


8 (a) Consider the following reaction scheme that starts from $[\text{Co}(\text{H}_2\text{O})_6]^{2+}$ ions. **W**, **X** and **Y** are ions and **Z** is a compound.



Identify **W**, **X**, **Y** and **Z** and write an equation for each of reactions **1** to **4**.

(Extra space) (12 marks)

(12 marks)

(Extra space)

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Question 8 continues on the next page

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- 8 (b)** A flue-gas desulfurisation process involves the oxidation, by oxygen, of aqueous sulfate(IV) ions (SO_3^{2-}) into aqueous sulfate(VI) ions (SO_4^{2-}). This reaction is catalysed by Co^{2+} ions in an acidic aqueous solution.

Write an equation for the overall reaction of sulfate(IV) ions with oxygen to form sulfate(VI) ions.

Suggest why this overall reaction is faster in the presence of Co^{2+} ions.

Suggest a mechanism for the catalysed reaction by writing **two** equations involving Co^{2+} and Co^{3+} ions. You will need to use H^+ ions and H_2O to balance these two equations.

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(4 marks)

16

END OF QUESTIONS

