This question is about cobalt chemistry. 8 Consider the following reaction scheme that starts from [Co(H₂O)₆]²⁺ ions. 8 (a) W, X and Y are ions and Z is a compound. Reaction 4 Reaction 2 $[Co(H_2O)_6]^{2+}$ Z pink/purple pale yellow dark brown precipitate solution solution Reaction 3 blue solution For each of the reactions 1 to 4, identify a suitable reagent. Identify W, X, Y and Z and write an equation for each of reactions 1 to 4. (12 marks) 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.
	(4 marks)

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END OF QUESTIONS

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