

**Section B**

Answer **all** questions in the spaces provided.

**7** Due to their electron arrangements, transition metals have characteristic properties including catalytic action and the formation of complexes with different shapes.

**7 (a)** Give **two other** characteristic properties of transition metals. For each property, illustrate your answer with a transition metal of your choice.

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(4 marks)

**7 (b)** Other than octahedral, there are several different shapes shown by transition metal complexes. Name **three** of these shapes and for each one give the formula of a complex with that shape.

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(6 marks)



**7 (c)** It is possible for Group 2 metal ions to form complexes. For example, the  $[\text{Ca}(\text{H}_2\text{O})_6]^{2+}$  ion in hard water reacts with  $\text{EDTA}^{4-}$  ions to form a complex ion in a similar manner to hydrated transition metal ions. This reaction can be used in a titration to measure the concentration of calcium ions in hard water.

**7 (c) (i)** Write an equation for the equilibrium that is established when hydrated calcium ions react with  $\text{EDTA}^{4-}$  ions.

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(1 mark)

**7 (c) (ii)** Explain why the equilibrium in part **(c) (i)** is displaced almost completely to the right to form the EDTA complex.

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(3 marks)

**7 (c) (iii)** In a titration,  $6.25\text{ cm}^3$  of a  $0.0532\text{ mol dm}^{-3}$  solution of EDTA reacted completely with the calcium ions in a  $150\text{ cm}^3$  sample of a saturated solution of calcium hydroxide. Calculate the mass of calcium hydroxide that was dissolved in  $1.00\text{ dm}^3$  of the calcium hydroxide solution.

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(3 marks)

(Extra space) .....

17

Turn over ►

