

Chapter 15

Transition elements

Print out and complete this worksheet to generate a summary for Chapter 15.

- 1** Write the full electron configuration for each of the following:

a V: _____

b Cu:

C Mn^{2+} :

d Co^{2+} :

e Cr^{3+} :

f Ni^{2+} :

- 2** Explain what is meant by a *transition element*.

- 3** Give three typical properties of a transition metal.

- 4** Describe what you would see when NaOH(aq) is added to $\text{FeSO}_4\text{(aq)}$.

- 5** Explain what is meant by a *bidentate ligand*.

- 6** Explain what is meant by *coordination number*.

- 7** Draw diagrams to illustrate optical isomerism in a transition metal complex.

Chapter 15 Transition elements

- 8 Write an equation to illustrate a ligand substitution reaction. Describe what you would see when this reaction is carried out.

Equation:

Observation:

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- 9 Define the *stability constant* for the formation of CoCl_4^{2-} from the hexaaquacobalt(II) ion $\text{Co}(\text{H}_2\text{O})_6^{2+}$.

- 10a Use the electrode potentials in the table to show that $\text{Zn}(\text{s})$ should be able to reduce $\text{VO}_2^+(\text{aq})$ to $\text{VO}^{2+}(\text{aq})$.

Reaction	E°/V
$\text{VO}_2^+(\text{aq}) + 2\text{H}^+(\text{aq}) + \text{e}^- \rightarrow \text{VO}^{2+}(\text{aq}) + \text{H}_2\text{O}(\text{l})$	+1.00
$\text{Zn}^{2+}(\text{aq}) + 2\text{e}^- \rightarrow \text{Zn}(\text{s})$	-0.76

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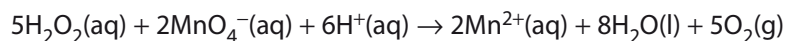
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- b Write a balanced equation for the reaction that occurs.

Chapter 15 Transition elements

- 11** Hydrogen peroxide reacts with potassium manganate(VII) according to the equation:



When 25.0 cm^3 of a solution of hydrogen peroxide acidified with excess sulphuric acid is titrated against $0.0200\text{ mol dm}^{-3}$ potassium manganate(VII) solution it is found that 26.35 cm^3 is required to reach the end point.

- a** Calculate the concentration of the hydrogen peroxide solution in mol dm^{-3} .

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- b** What volume of oxygen will be released at RTP during the course of the titration?

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