

## 24 Transition elements

Specification reference	Checklist questions	
5.3.1 a	Can you describe the electron configuration of atoms and ions of the d-block elements of Period 4 (Sc–Zn), given the atomic number and charge?	<input type="checkbox"/>
5.3.1 b	Can you describe the elements Ti–Cu as transition elements i.e. d-block elements that have an ion with an incomplete d-sub-shell?	<input type="checkbox"/>
5.3.1 c i	Can you show using examples the formation of coloured ions?	<input type="checkbox"/>
5.3.1 c ii	Can you show using examples the existence of more than one oxidation state for each element in its compounds?	<input type="checkbox"/>
5.3.1 c iii	Can you show using examples the catalytic behaviour of the elements and their compounds and their importance in the manufacture of chemicals by industry?	<input type="checkbox"/>
5.3.1 d	Can you explain and use of the term <i>ligand</i> in terms of coordinate (dative covalent) bonding to a metal ion or metal, including bidentate ligands?	<input type="checkbox"/>
5.3.1 e i	Can you use the terms complex ion and coordination number to show six-fold coordination with an octahedral shape?	<input type="checkbox"/>
5.3.1 e ii	Can you use the terms complex ion and coordination number to show four-fold coordination with either a planar or tetrahedral shape?	<input type="checkbox"/>
5.3.1 f i	Can you describe <i>cis–trans</i> isomerism?	<input type="checkbox"/>
5.3.1 f ii	Can you describe optical isomerism?	<input type="checkbox"/>
5.3.1 g	Can you describe the use of <i>cis-platin</i> as an anticancer drug and its action by binding to DNA preventing cell division?	<input type="checkbox"/>

Specification reference	Checklist questions	
5.3.1 h i	Can you describe ligand substitution reactions and the accompanying colour changes in the formation of $[\text{Cu}(\text{NH}_3)_4(\text{H}_2\text{O})_2]^{2+}$ and $[\text{CuCl}_4]^{2-}$ from $[\text{Cu}(\text{H}_2\text{O})_6]^{2+}$ ?	<input type="checkbox"/>
5.3.1 h ii	Can you describe ligand substitution reactions and the accompanying colour changes in the formation of $[\text{Cr}(\text{NH}_3)_6]^{3+}$ from $[\text{Cr}(\text{H}_2\text{O})_6]^{3+}$ ?	<input type="checkbox"/>
5.3.1 i	Can you explain of the biochemical importance of iron in haemoglobin, including ligand substitution involving $\text{O}_2$ and $\text{CO}$ ?	<input type="checkbox"/>
5.3.1 j i	Can you describe reactions, including ionic equations, and the accompanying colour changes of aqueous $\text{Cu}^{2+}$ , $\text{Fe}^{2+}$ , $\text{Fe}^{3+}$ , $\text{Mn}^{2+}$ and $\text{Cr}^{3+}$ with aqueous sodium hydroxide and aqueous ammonia, including precipitation reactions?	<input type="checkbox"/>
5.3.1 j ii	Can you describe reactions, including ionic equations, and the accompanying colour changes of aqueous $\text{Cu}^{2+}$ , $\text{Fe}^{2+}$ , $\text{Fe}^{3+}$ , $\text{Mn}^{2+}$ and $\text{Cr}^{3+}$ with aqueous sodium hydroxide and aqueous ammonia, including complex formation with excess aqueous sodium hydroxide and aqueous ammonia?	<input type="checkbox"/>
5.3.1 k i	Can you recall redox reactions and accompanying colour changes for interconversions between $\text{Fe}^{2+}$ and $\text{Fe}^{3+}$ ?	<input type="checkbox"/>
5.3.1 k ii	Can you recall redox reactions and accompanying colour changes for interconversions between $\text{Cr}^{3+}$ and $\text{Cr}_2\text{O}_7^{2-}$ ?	<input type="checkbox"/>
5.3.1 k iii	Can you recall redox reactions and accompanying colour changes for interconversions between $\text{Cu}^+$ and $\text{Cu}^{2+}$ ?	<input type="checkbox"/>
5.3.1 l	Can you interpret and predict unfamiliar reactions including ligand substitution, precipitation, redox?	<input type="checkbox"/>