

Transition Metals: Review

- Write down configurations for the following metals:
 - Ni
 - Zr
 - Cd^{2+}
 - Ru^{3+}
 - Mo^{4+}
- Define each of the following
 - Ligand
 - Chelate
 - Bidentate
 - Complex ion
- What must a ligand have in order to bond to a metal?
- What do we mean when we say that a bond is a coordinate bond?
- Name the following coordination compounds, and the complex ions:
 - $(\text{Co}(\text{NH}_3)_6)\text{Cl}_2$
 - $\text{K}_2(\text{PtCl}_4)$
 - $\text{Ru}(\text{NH}_3)_5\text{Cl}^{2+}$
 - $\text{Fe}(\text{CN})_6^{4-}$
- Why do transition metal ions often have several oxidation states, while other metals generally have one? Describe the maximum oxidation states observed along the series $\text{Sc} \rightarrow \text{Zn}$, identifying the element with the highest oxidation state and give the value of this state. What is the most common oxidation state of the elements $\text{Co} \rightarrow \text{Zn}$?
- What is meant by a transition element? Summarize, with examples, the distinctive properties of transition elements and show how they are related to the electronic structure of these elements.
- This question concerns the d-block elements $\text{Sc} \rightarrow \text{Zn}$
 - Describe the general electronic configuration of these elements and the exceptional configurations of chromium and copper
 - Describe the bonding in these elements. Use a bonding model to account for the general increase in melting points from Sc (1540°C) to Cr (1857°C), followed by a general decrease to Cu (1083) and Zn (420°C).
 - Explain why the compounds of these elements are often coloured.
 - Iron is an important d-block element. Identify one **physical property** of iron that is similar to that of calcium and one that is different. Account for similarities and the differences on the atomic level. Give two ways in which the properties of the **compounds** of iron differ from those of calcium.