

Review: Transition Metals

1. Electron configuration for:
 - a. Cr
 - b. Cr^{2+}
2. Oxidation number for:
 - a. $\text{Cr}_2\text{O}_4^{2-}$
 - b. CrO_4^{2-}
 - c. CrCl_4^{2-}
3. Classify as oxidation or reduction and balance
 $\text{Cr}_2\text{O}_4^{2-} \rightarrow \text{CrO}_4^{2-} + \text{Cr}^{3+}$
4. Identify (i) central ion (ii) ligand (iii) Coordination number
 - a. $\text{Cr}(\text{NH}_3)_4^{2+}$
 - b. $\text{CrCl}(\text{H}_2\text{O})_5^{2+}$
 - c. $(\text{NH}_4)_3\text{VF}_6$
5. Given Coordination number, write the formula and name of the complex ion formed
 - a. $\text{Cu}^{2+} + \text{H}_2\text{O}$ (CN = 4)
 - b. $\text{Fe}^{3+} + \text{CN}^-$ (CN = 6)
 - c. $\text{Ni}^{2+} + \text{Cl}^-$ (CN = 4)
 - d. $\text{Ag}^+ + \text{NH}_3$ (CN = 2)
 - e. $\text{Cu}^{2+} + \text{Cl}^-$ (CN = 4)
6. Identify 4 types of bonding in $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$
7. Compare the trends in Atomic radii, IE, energy for the elements in a short period (3 marks) to those of TM. Explain in terms of electron arrangement
8. Give 4 properties/characteristics of d-block elements and of their compounds. Illustrate your answers with suitable examples.
9. Why Sc and Zn do not behave as typical d-block elements?
10. $\text{Cu}^{2+}(\text{H}_2\text{O})_4$ is blue. When conc. HCl is added it turns yellow/green. Why? Explain.
11. Which can act as a ligand: PH_3 , PH_4^+ , F^- , $\text{C}_2\text{O}_4^{2-}$, H_2O
12. The stability constants of Z complex ions are:
 - i) $\text{Cu}(\text{NH}_3)_4^{2+}$ $K_c = 1.58 \times 10^{13}$
 - ii) CuCl_4^{2-} $K_c = 3.98 \times 10^5$

- a) Write the equation to which these constants refer
- b) Use the equation and stability constants to predict what would happen if NH_3 solution were added drop by drop to a solution of CuCl_4^{2-} ions

13. a) What are geometric isomers?

c) Draw the structure families of CrS^- and trans dichlorodiammine cobalt(II)

14. Explain why a H_2O solution of copper(II)sulphate is used to filter out heat waves (red end of spectrum)?