

AY 2024-25---B.TECH-----MODULE 1.0-----EXERCISES.

1. What is atomic radii? give its variation along the period and down the group taking examples.
2. Ionisation energy is greater in N than Oxygen? Similarly P is greater than Sulphur. Reason out.
3. Reason out radii of Mg^{++} ions are greater than Mg whereas Cl^- is lower than Cl?
4. Based on CFT, find out the number of unpaired electrons for a Mn^{++} complexes in strong and weak field ligands. Calculate CFSE, spin only magnetic moment for both the situation.
5. An octahedral complexes absorbs light with wavelength of 535nm. what is the crystal field splitting for the complex? what colour is it to the eye? [$h = 6.625 \times 10^{-34} \text{ J.s}$]
6. A $M(H_2O)_6$ typically absorbs 600 nm. and it is allowed to react with ammonia to form $M(NH_3)_6$ that should have absorption at wavelength of -----nm.
7. Explain why transition metal compounds with strong field ligands are yellow , orange or red whereas with weak field ligands they are blue-green or Indigo.?
8. Calculate Effective nucleus charge of electron in (i) 3p orbital of Aluminium atom (Z of Al=13) (ii) 3d electron of Cu (Z=29)
9. Calculate Effective nucleus charge of electron 4s electron of Zinc (Z =30)
10. $[Co(NH_3)_6]$ is diamagnetic and orange yellow whereas $[Co(F_6)]$ is paramagnetic and blue. Justify
11. A tetrahedral complex absorbs at 545nm. What is the respective octahedral crystal field splitting (Δ_o) [first calculate Δ_t . Then $\Delta_t = 4/9 \Delta_o$]
12. Draw crystal field of Ni^{+2} complex for an octahedral field and tetrahedral field., labelling the d-orbitals. State whether the geometry is consistent with paramagnetic species
13. Define electronegativity? give its variation along the period and down the group with examples.
14. Discuss the optical isomerism exhibited by transition metal compounds with any 2 examples.
15. Why $Cu(I)$ complexes tend to be colourless, whereas $Cu(II)$ as $Cu(NO_3)_2 \cdot 5H_2O$ are brightly coloured.