

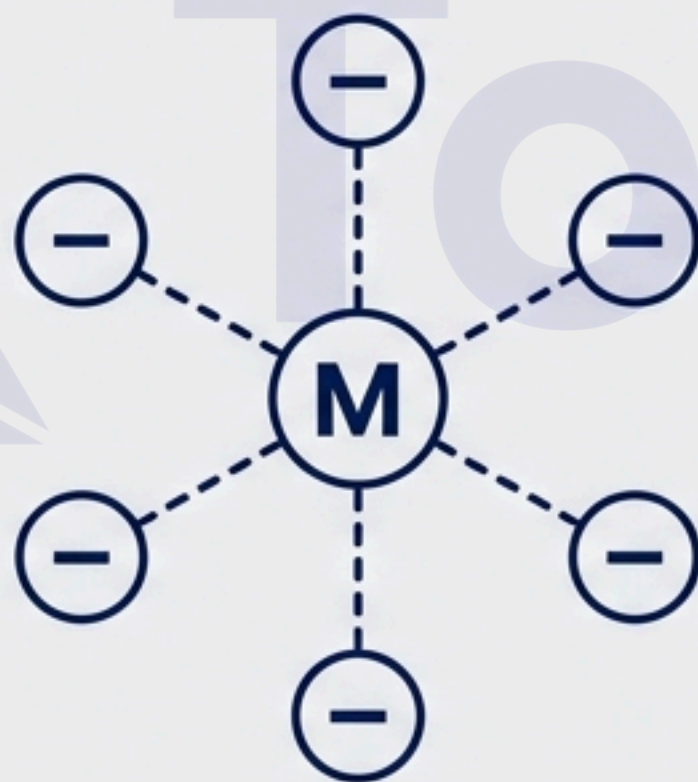
UNIT 5 • COORDINATION COMPOUNDS

Limitations of Crystal Field Theory

Where the electrostatic model falls short of reality.

CFT treats ligands as point charges.

The model assumes purely ionic, electrostatic interactions between the metal ion and the ligand. Anions are treated as negative point charges, and neutral molecules as dipoles.





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Key Highlights

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Point-Charge Logic

Anionic ligands should theoretically exert the greatest electrostatic repulsion, leading to maximum d-orbital splitting.

Maximum Repulsion



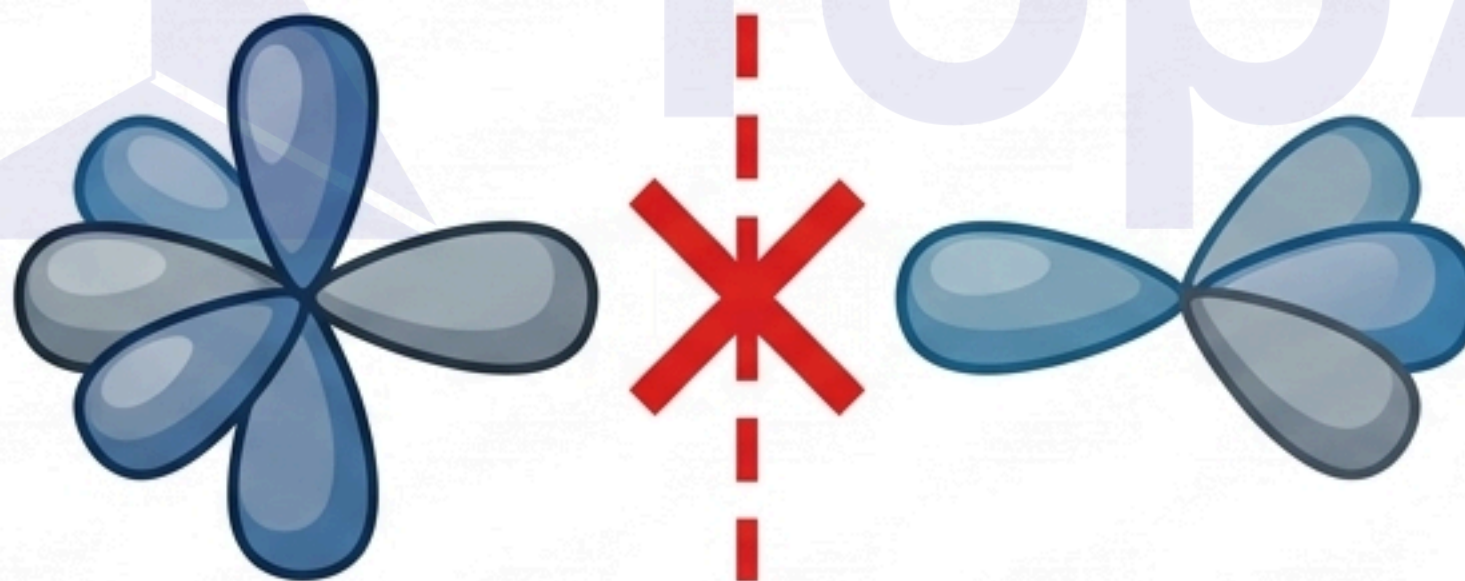
The Spectrochemical Reality

Experimental data proves anionic ligands actually sit at the lowest end of the spectrochemical series, causing the least splitting.



Ignores covalent character of the M-L bond.

By assuming 100% ionic interactions, CFT completely fails to account for the orbital overlap and electron sharing that occurs between metals and ligands.



Based strictly on the point-charge assumption of CFT, which ligand should theoretically cause the highest splitting?

A) CO

B) NH₃

C) H₂O

D) Cl⁻



Watch for this: The point-charge assumption predicts anionic ligands like Cl⁻ split the most. Real spectrochemical data shows they split the least! On exams, carefully read if the question asks for the CFT prediction or the actual position.

Key Takeaways

- ✓ **The Anion Anomaly**

Point-charge logic predicts anions exert the greatest splitting effect, but reality places them at the lowest end of the spectrochemical series.

- ✓ **The Covalent Blindspot**

CFT assumes 100% ionic bonds, completely ignoring the covalent character of metal-ligand interactions.



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