

The True Definition of Coordination Number

The coordination number (CN) of a metal ion in a complex is strictly defined by the points of attachment, not the entities attaching.

Molecular Blueprint

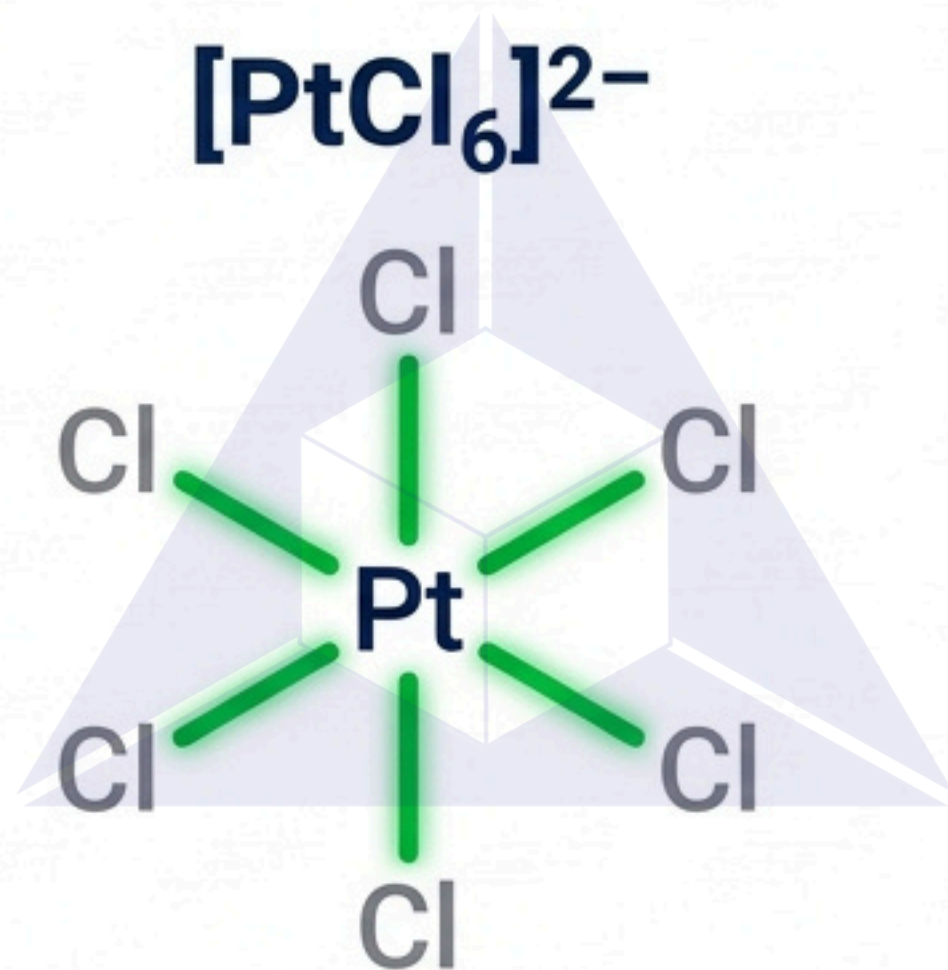
Coordination Number = Number of Ligand Donor Atoms



RULE 01: COUNT THE BONDS, NOT THE MOLECULES

The Baseline: Unidentate Ligands

When a ligand is unidentate, the number of ligands matches the number of donor atoms.



Coordination Number = 6

1 LIGAND = 1 DONOR ATOM

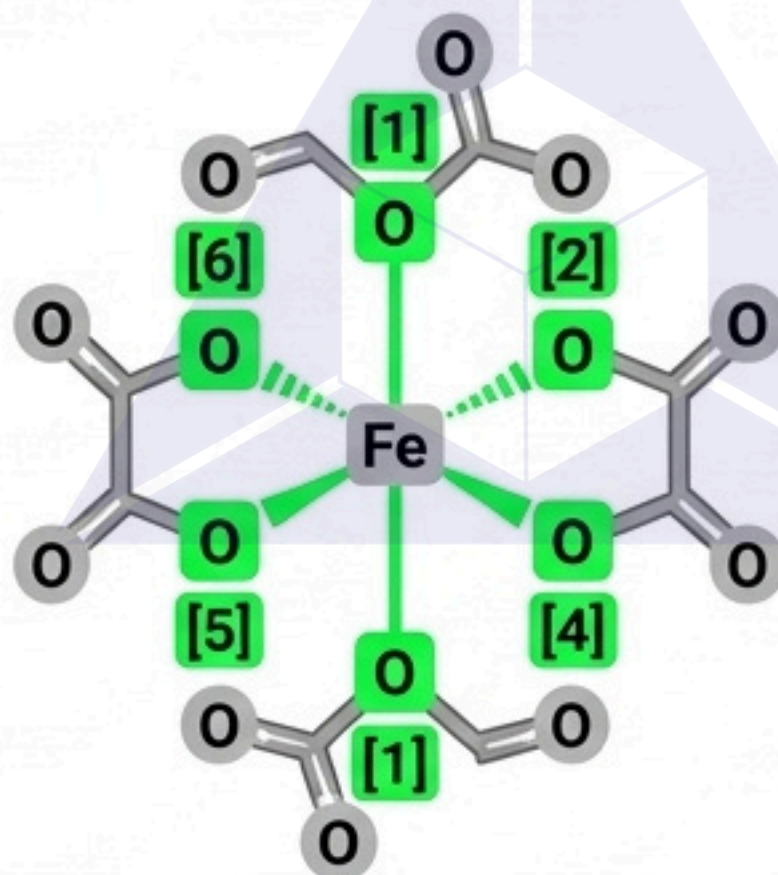


Coordination Number = 4

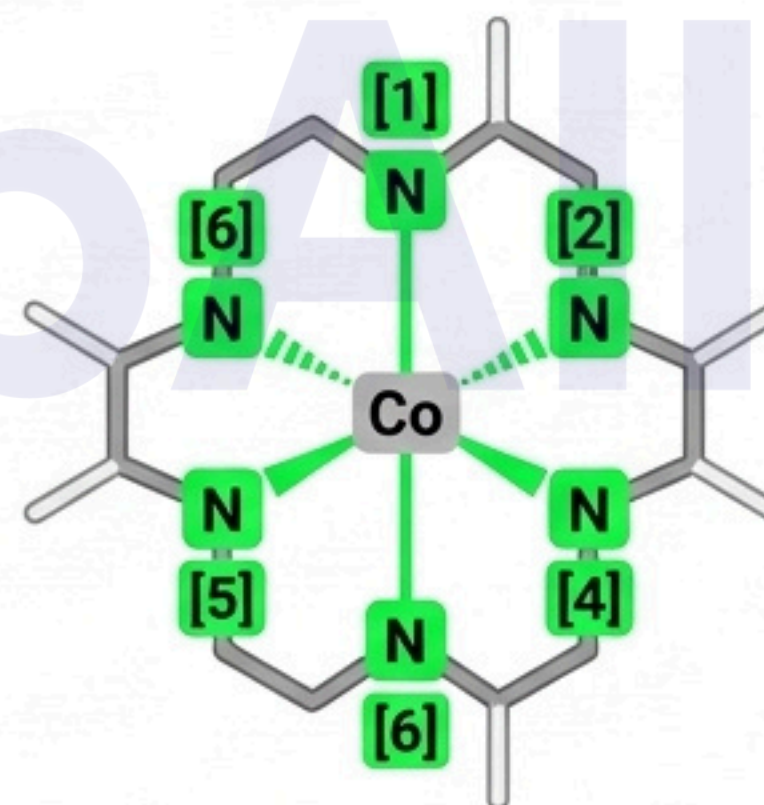
1 LIGAND = 1 DONOR ATOM

The Didentate Twist: Why Ligand Count Fails

For didentate ligands like oxalate and ethane-1,2-diamine, a single molecule provides two donor atoms.



DIDENTATE:
1 LIGAND = 2 DONOR ATOMS



3 Ligands -> 6 Donor Atoms (CN = 6)

3 Ligands -> 6 Donor Atoms (CN = 6)



You've Learned the Theory. Let's Test Them Now.

$$E=mc^2$$



Turn theory into marks with **unlimited MCQs, smart analysis, and focused revision.**

Practice Now



At prep.topall.app

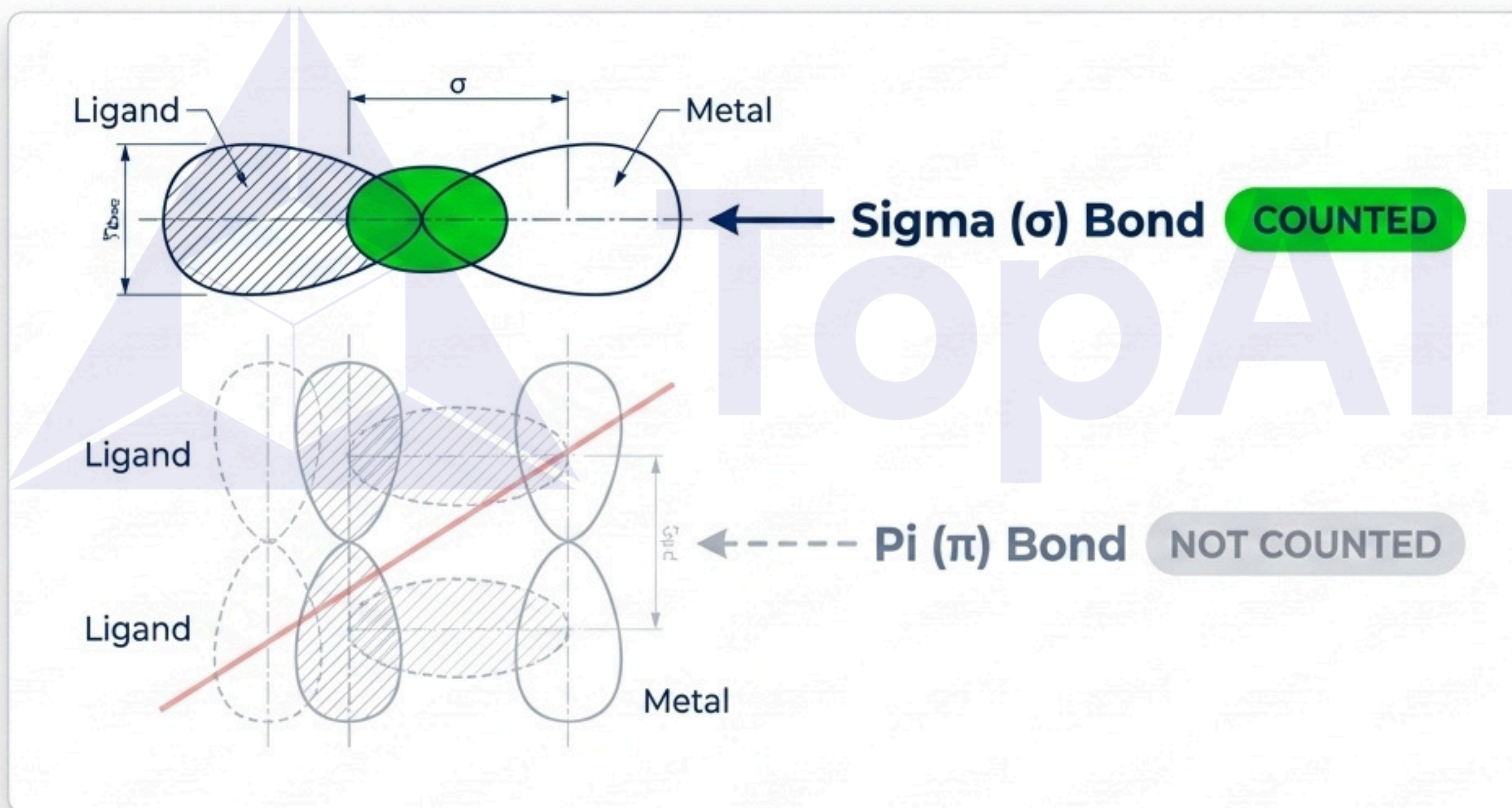
Key Highlights

- » Free Study Material, Videos & Infographics
- » Push Your Limits with Level-Based Challenges
- » Climb the Leaderboard Among Fellow Aspirants
- » Practice Unlimited MCQs for NEET & JEE
- » Get Clear Explanations, Not Just Marks
- » Track Your Performance Smarter



The Technical Caveat: Sigma vs. Pi Bonds

Coordination number is determined only by the number of sigma (σ) bonds formed. Pi (π) bonds between the ligand and central atom are strictly ignored.



Diagnosing the Common Mistake

Relying on the literal “number of ligands” creates a false equivalence that completely fails for **di- or polydentate** complexes.

Complex Formula	Ligand Count (The Trap)	Donor Atoms (Actual CN)
$[\text{PtCl}_6]^{2-}$	6	6 (Matches)
$[\text{Ni}(\text{NH}_3)_4]^{2+}$	4	4 (Matches)
$[\text{Fe}(\text{C}_2\text{O}_4)_3]^{3-}$	3	6 (Diverges!)
$[\text{Co}(\text{en})_3]^{3+}$	3	6 (Diverges!)

Notice how $[\text{Fe}(\text{C}_2\text{O}_4)_3]^{3-}$ and $[\text{Co}(\text{en})_3]^{3+}$ only have 3 ligands, but a true coordination number of 6.

The Coordination Checklist

01

Count the Donor Atoms

Never assume the number of ligand molecules equals the coordination number. Look for the actual points of attachment.

02

Identify Didentate Ligands

Remember that molecules like oxalate ($\text{C}_2\text{O}_4^{2-}$) and ethane-1,2-diamine (en) contribute two donor atoms per molecule.

03

Filter by Bond Type

Only Count Sigma Bonds. If secondary pi (π) bonds form between the ligand and the central atom, they are strictly ignored in the final count.



You've Learned the Theory.

Now Let's Test It.

Reading notes gets you knowledge.

Practicing MCQs gets you marks.

That's exactly what TopAll Pro is built for.

Try TopAll Pro Now

What TopAll Pro Does Differently

-  **Stuck? Snap it. Solve it. — Doubts AI**
Photo → step-by-step solution in seconds, 24/7
-  **Your AI Coach finds your blind spots**
Concept-level weakness detection — not just chapter-level
-  **4.5 Lakh+ questions. Never run out.**
13× more content than any other prep app in India
-  **Build your own test in 60 seconds**
Pick a chapter, set difficulty — AI does the rest instantly.
-  **AI Recommendation that helps you improve**
AI Recommendation Analysis your Tests and tell you where you need to improve.



Practice the moment you finish studying
Jump in while the concept is still fresh in your head

4.5L+
MCQs

1.5L+
Students

AI Powered
In-Depth Analysis