

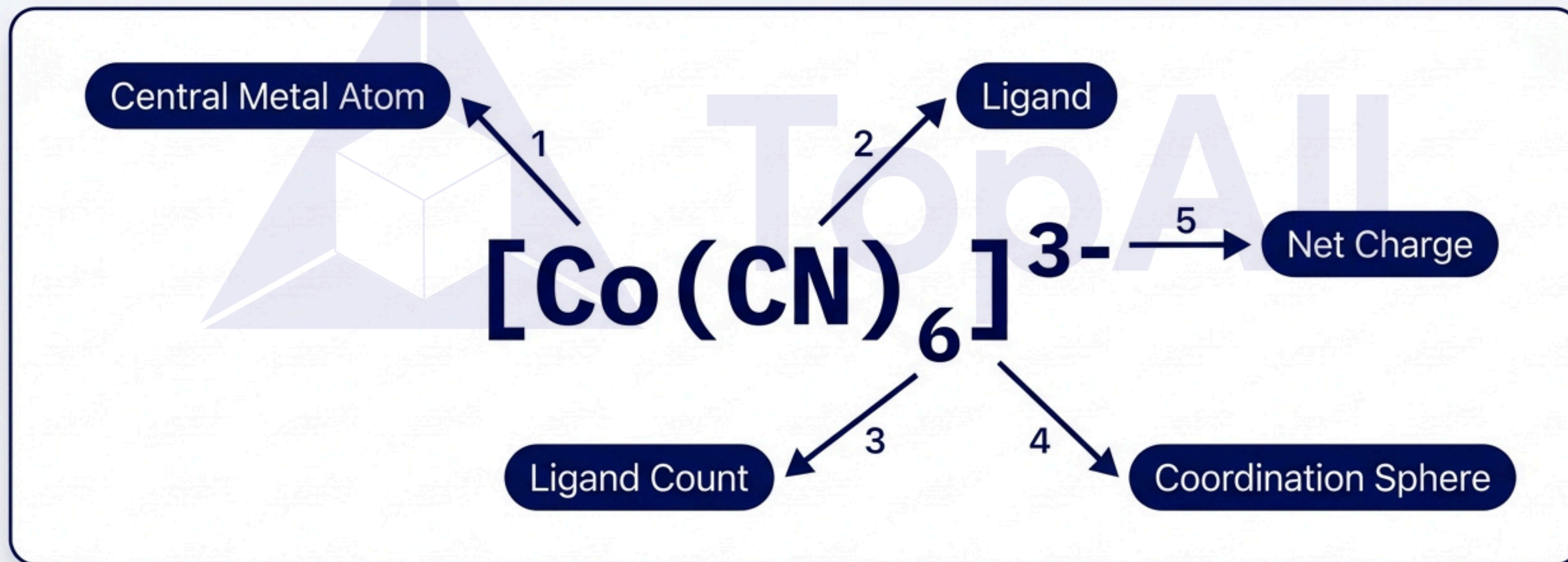
# Writing Formulas for Mononuclear Coordination Entities

**A Step-by-Step Blueprint for Exam Mastery**

Master the exact IUPAC rule sequence for constructing chemical formulas with precision and zero errors.

# What is a Mononuclear Coordination Entity?

A coordination entity containing a single central metal atom surrounded by ligands. Here is the anatomical breakdown:





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

$$E=mc^2$$



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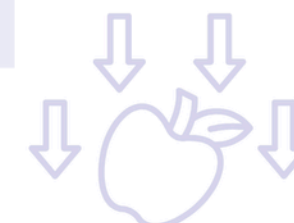
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## Key Highlights

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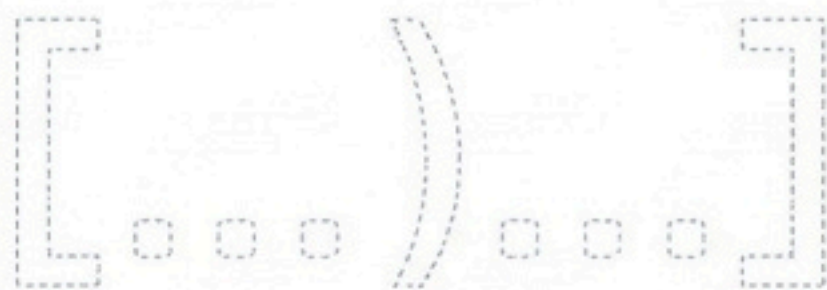
# The Core & The Order

Every formula begins with the metal, followed by a strict sorting of the surrounding ligands.

## RULE 1

### Central Atom First

The symbol for the central metal atom is always listed first in the formula.



## RULE 2

### Alphabetical Ligands

Ligands are listed in alphabetical order based on their chemical symbol or name.

⚠ *Placement in the list does NOT depend on the ligand's charge.*

# Treatment of Polydentate & Abbreviated Ligands

Complex ligands follow the exact same alphabetical logic, but with a specific rule for abbreviations.

## **RULE 3**

### **Alphabetizing Polydentate Ligands**

Polydentate ligands are listed alphabetically alongside all other ligands.



### **The Abbreviation Rule**

When a ligand is abbreviated (e.g., en for ethane-1,2-diamine), use the first letter of the abbreviation to determine its position in the alphabetical sequence.

# Enclosing the Coordination Sphere

Structural punctuation is critical for delineating the complex from its environment.

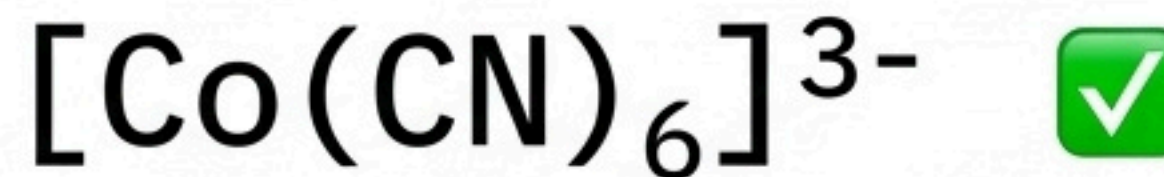
## RULE 4 Brackets & Parentheses

The entire coordination entity is enclosed in square brackets [ ]. Polyatomic ligands (like CN) and abbreviated ligands must be enclosed in parentheses ( ).



## RULE 5 Zero Spacing

There must be absolutely no spaces between the ligands and the metal within the coordination sphere.



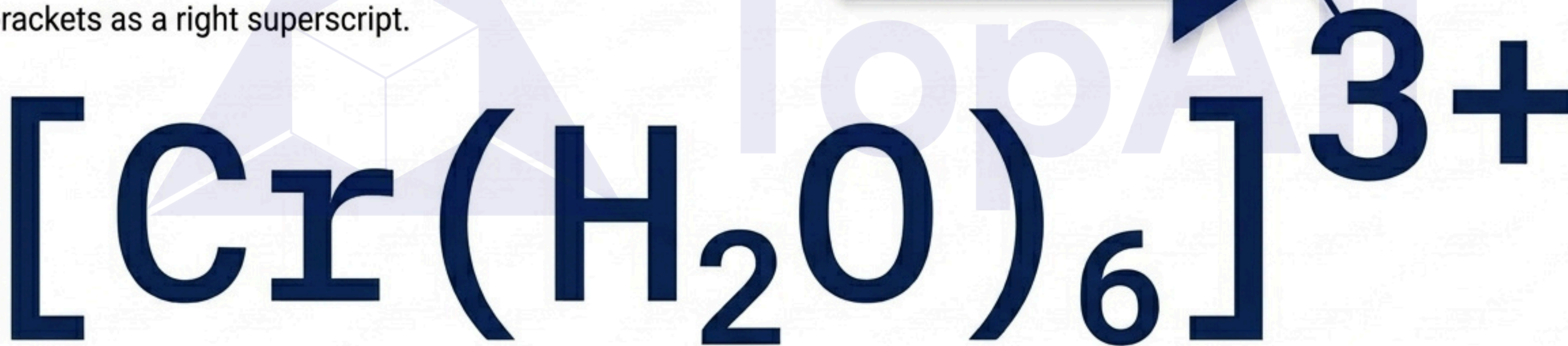
# Indicating the Net Charge

When writing a charged coordination entity without its counter ion, the charge must be explicitly stated.

## **RULE 6** Right Superscript Format

The charge is indicated outside the square brackets as a right superscript.

The number (3) must come before the sign (+).



 *Exam Tip: In a full compound, the charge of the cation(s) is perfectly balanced by the charge of the anion(s) (Rule 7).*

# Key Takeaways: The 5.3.1 Sequence

Verify your formulas against this strict sequence before submitting your answers.

## 1. Metal First

Central atom symbol always leads.

## 2. Alphabetical Ligands

Sort strictly by name/symbol (ignore charge).

## 3. Abbreviations

Use the first letter of abbreviations to alphabetize.

## 4. Proper Enclosures

[ ] for the whole entity, ( ) for polyatomic/abbreviated ligands.

## 5. No Spaces

Keep the entire coordination sphere tightly packed.

## 6. Superscript Charge

Place charge outside right bracket (Number first, then Sign).

✨ You're ready! Master this sequence and structural formulas will become second nature.



# You've Learned the Theory.

## Now Let's Test It.

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