

UNIT 4 • d- AND f-BLOCK ELEMENTS

Formation of Complex Compounds

The structural mechanics behind
transition metal complexes.

Essential Vocabulary

Complex Compound

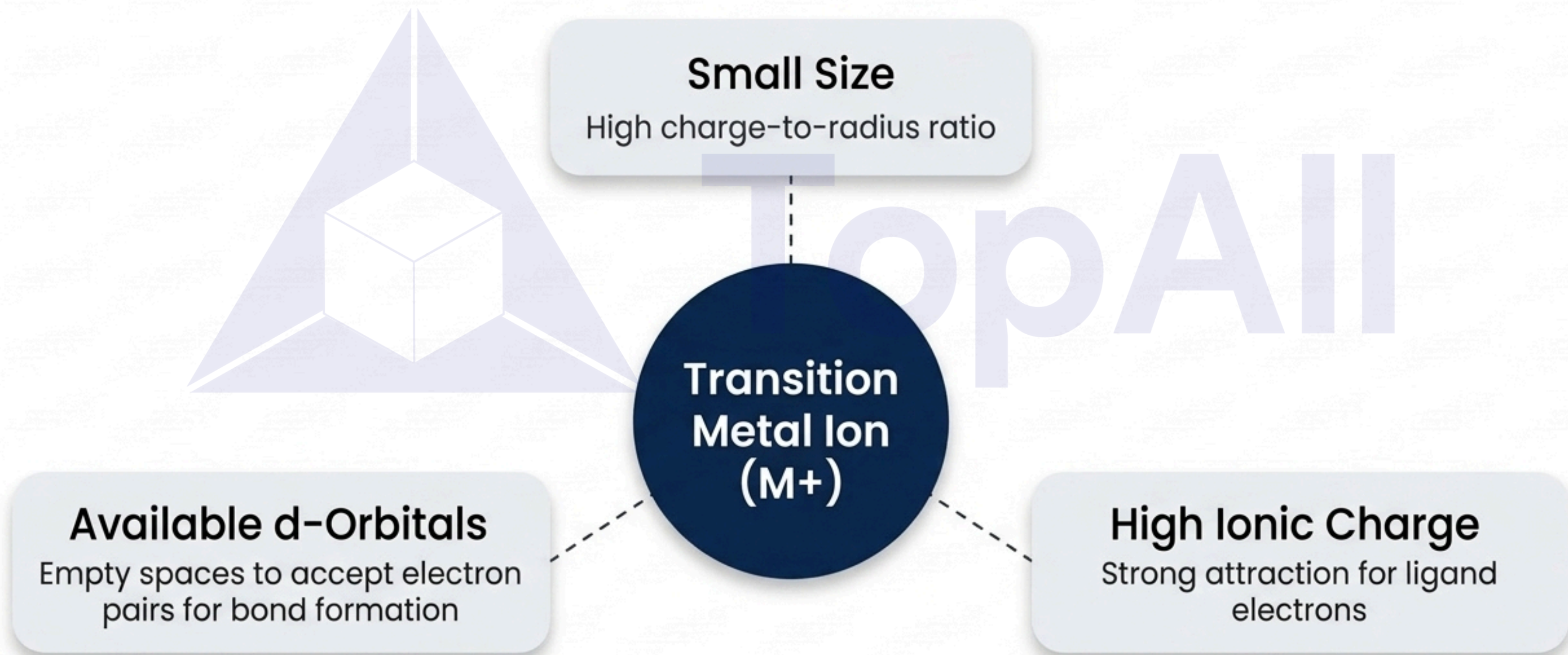
A species where a central metal ion binds a number of anions or neutral molecules, resulting in characteristic properties.

Ligand

The surrounding anions or neutral molecules that donate electrons to bind with the central metal ion.

The Mechanics of Complex Formation

Why do transition metals form so many complex compounds?





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

$$E=mc^2$$



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Key Highlights

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NCERT Fact Bank: Notable Complex Ions



Hexacyanoferrate(III)



Hexacyanoferrate(II)



Tetraamminecopper(II)



Tetrachloridoplatinate(II)

Examiner Tactics

Watch for this: The ‘Isolated Factor’ Trap

Questions will often try to trick you by listing only one factor (e.g., ‘Transition metals form complexes solely due to their small size”).

Remember that all THREE factors—small size, high charge, and available d-orbitals—work together to enable complex formation. Never isolate them.

Concept Check

The large number of complex compounds formed by transition metals is primarily due to:

Comparatively smaller sizes of the metal ions only.

High ionic charges of the metals only.

The availability of d-orbitals for bond formation only.

The combination of small size, high ionic charge, and available d-orbitals.

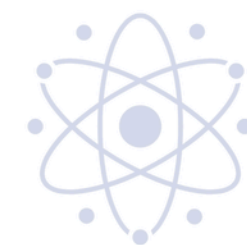
Concept Mastered

- The ability of transition metals to form complexes relies on the **synergy of three factors**: small ionic size, high ionic charge, and the availability of empty d-orbitals for bonding.
- High-yield NCERT examples to recognize include $[\text{Fe}(\text{CN})_6]^{3-}$, $[\text{Fe}(\text{CN})_6]^{4-}$, $[\text{Cu}(\text{NH}_3)_4]^{2+}$, and $[\text{PtCl}_4]^{2-}$, $[\text{PtCl}_4]^{2-}$.



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