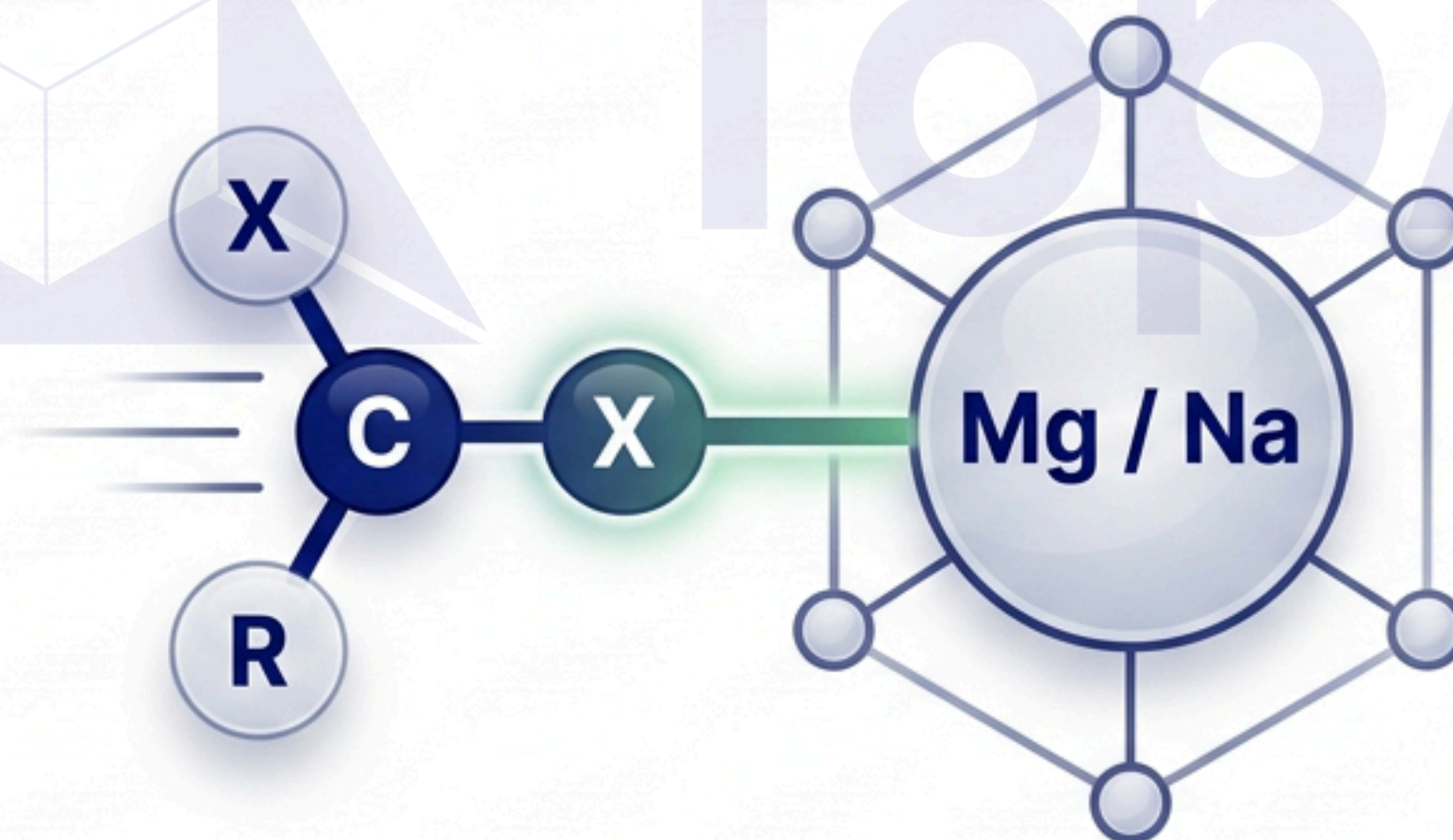


Haloalkanes Meet Metals

Synthesizing Organometallics: The Grignard & Wurtz Reactions



The Magic of Organometallics

Standard Alkyl Halide



The halogen pulls electrons.
Carbon remains electron-poor
and electrophilic.

Organometallic Bond



The metal pushes electrons.
Carbon undergoes polarity
inversion to become electron-
rich and nucleophilic.

Victor Grignard's Discovery (1900)



Alkyl magnesium halides (Grignard reagents) form when haloalkanes react with magnesium metal.



Crucial Condition: Dry Ether

The reaction must take place in completely anhydrous (dry) ether.



Dry Ether



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$$E=mc^2$$



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Key Highlights

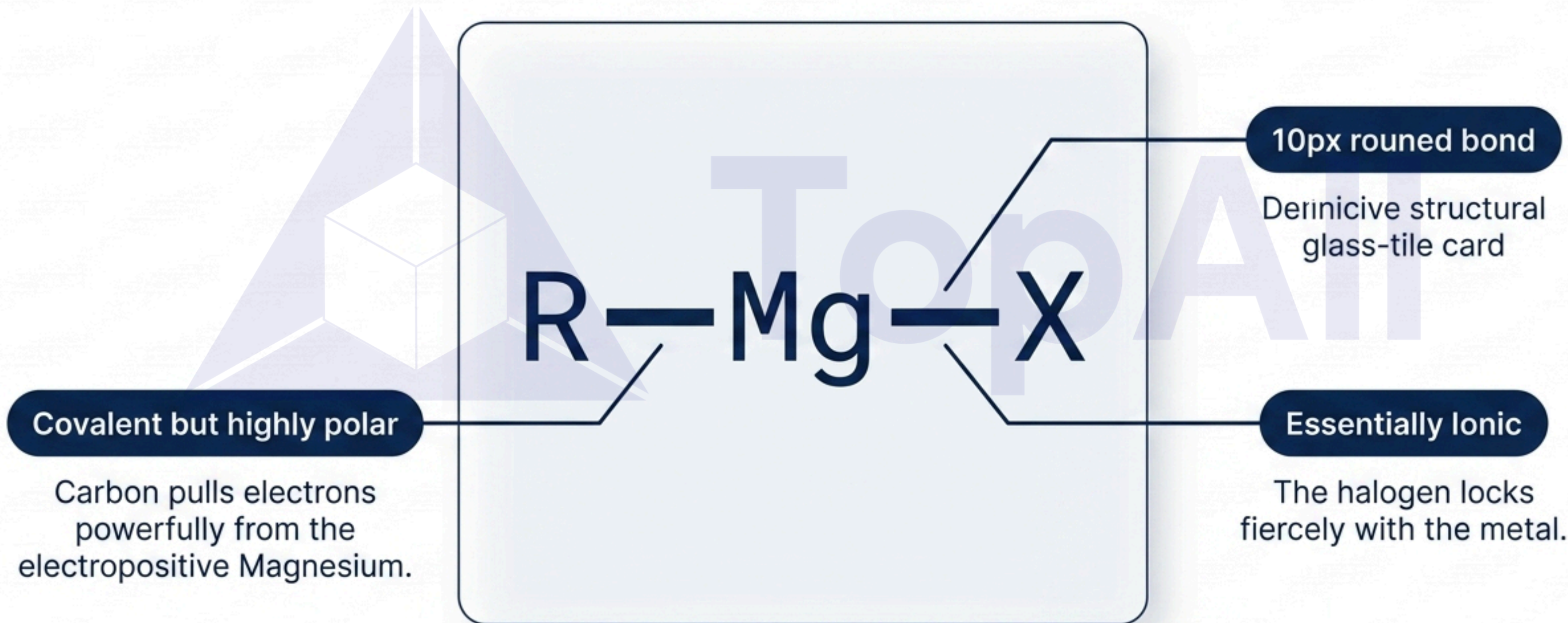
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Inside the RMgX Structure



This internal structural tension dictates the reagent's aggressive reactivity.



DANGER: Trace Moisture



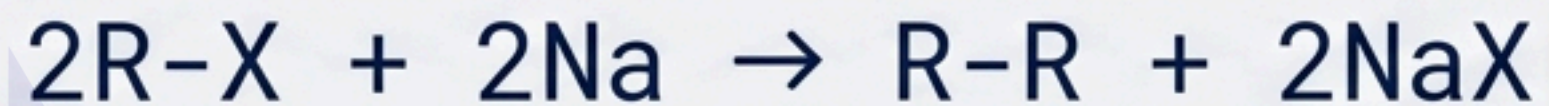
Grignard reagents are fiercely reactive. Even trace amounts of proton sources (water, alcohols, amines) will instantly destroy the reagent.



Key Concept

Silver Lining: While this ruins the Grignard reagent, it is a perfectly valid synthetic route to convert halides into basic hydrocarbons.

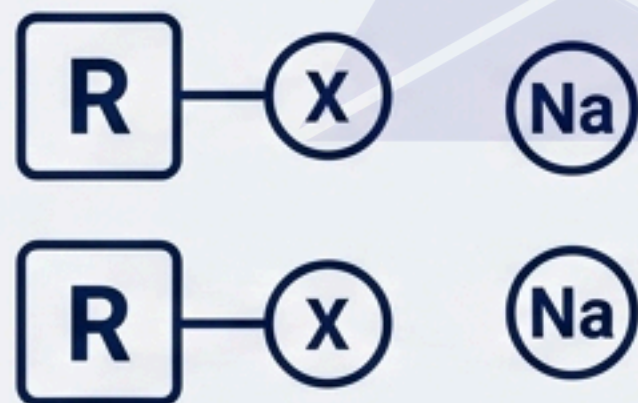
Wurtz: Doubling the Chain



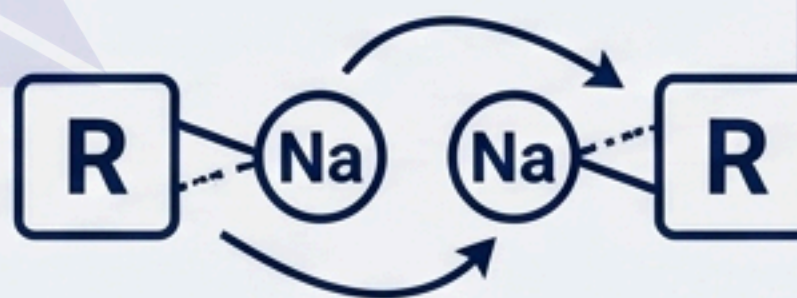
Requires
Dry Ether

Sodium Coupling

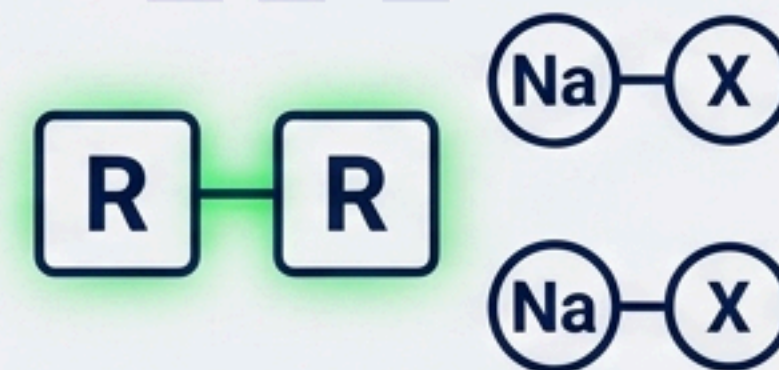
Phase 1 (Reactants)



Phase 2 (Transition)

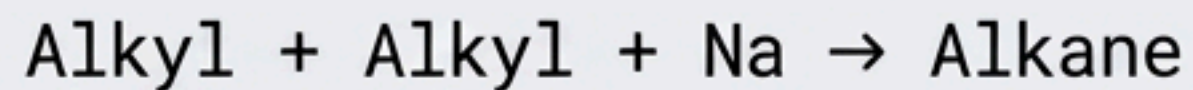
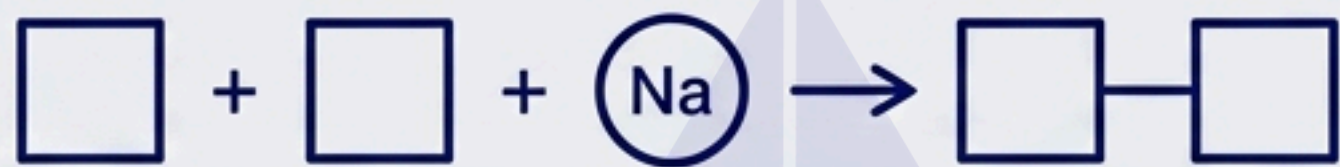


Phase 3 (Product)



Extending the Wurtz Principle

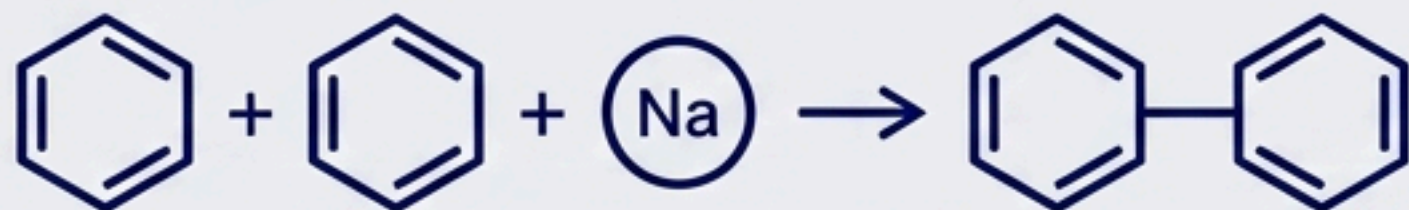
Wurtz



Wurtz-Fittig



Fittig



Grignard vs. Wurtz Comparison

Key Concept

Dimension	Grignard Reaction	Wurtz Reaction
Metal Catalyst	Magnesium (Mg)	Sodium (Na)
Solvent	Dry Ether ⚠	Dry Ether ⚠
Primary Product	Organometallic (RMgX)	Higher Alkane (R-R)
Primary Use	Building block for complex synthesis	Doubling carbon chain length
Moisture Sensitivity	Destroys reagent (forms R-H)	Prevents reaction



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