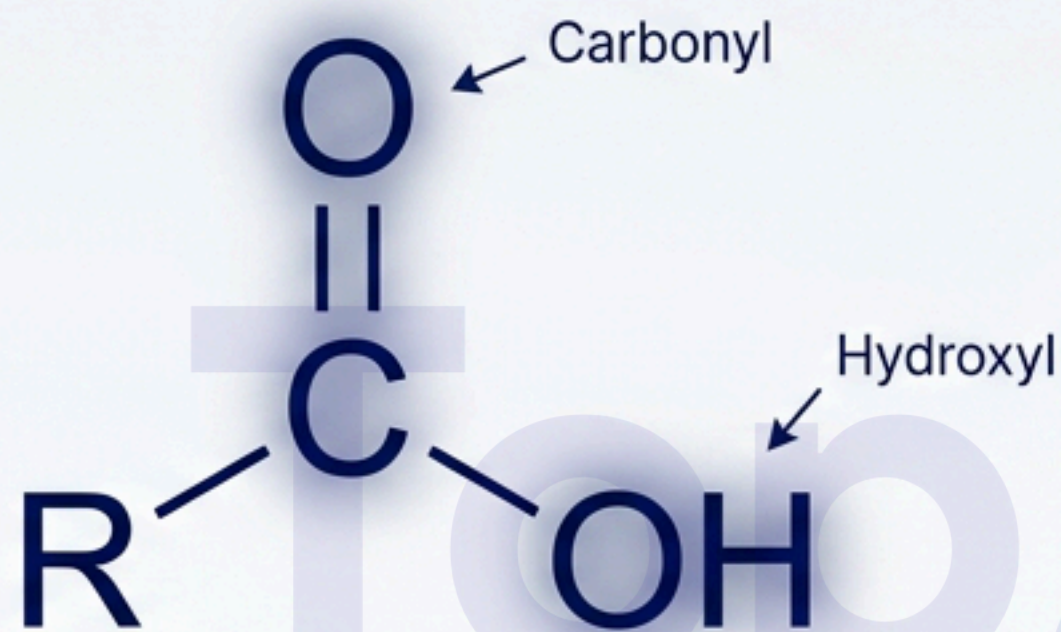


Methods of Preparation of Carboxylic Acids



[Oxidation Routes]

1

Upgrading alcohols, aldehydes, and alkylbenzenes.

[Hydrolysis Routes]

2

Cleaving nitriles, amides, and acyl derivatives.

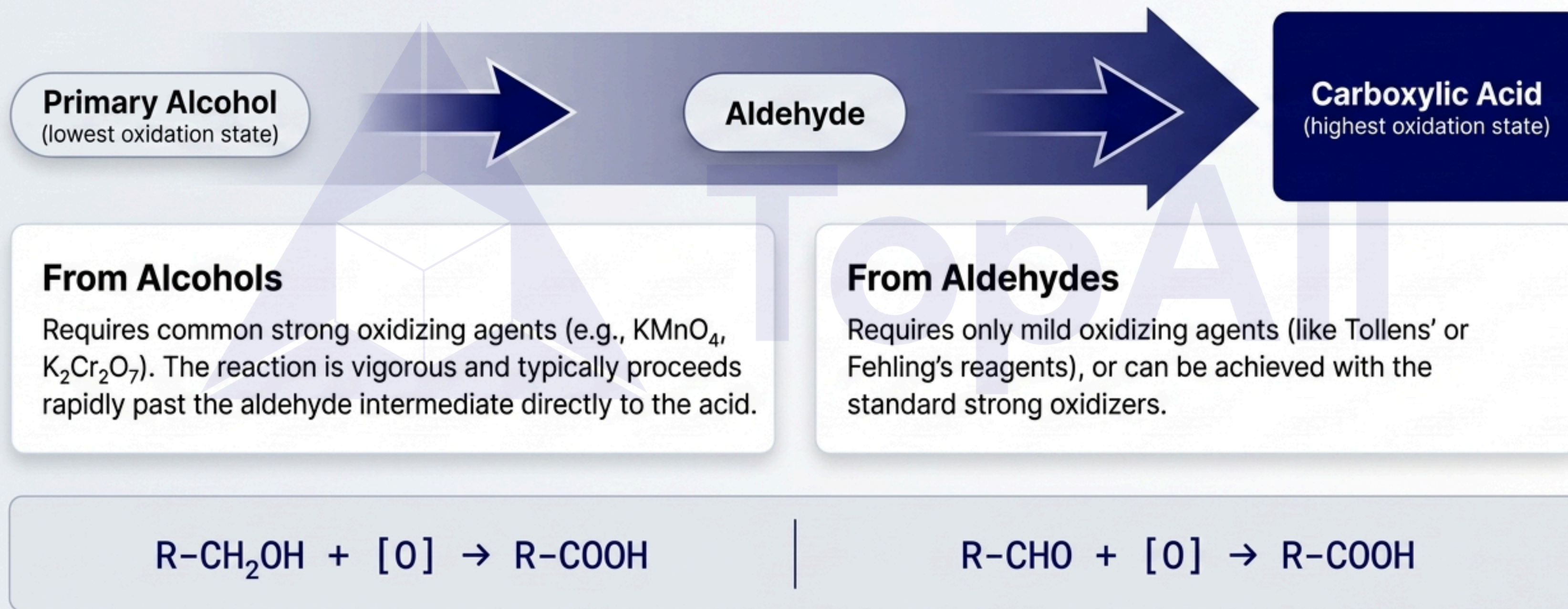
[Carbon-Building Routes]

3

Ascending the series via Grignard reagents.

A definitive visual guide to synthesizing $R-COOH$ and $Ar-COOH$ from six distinct starting materials.

Upgrading Alcohols & Aldehydes



The most direct pathway to convert an existing terminal oxygen-containing carbon chain into a carboxylic acid.

The Oxidation Toolkit

Potassium Permanganate (KMnO_4)

Conditions:

Neutral, acidic, or alkaline media.

Profile:

Highly vigorous, versatile across different pH environments.

Potassium Dichromate ($\text{K}_2\text{Cr}_2\text{O}_7$)

Conditions:

Acidic media only.

Profile:

Standard strong oxidizer.

Chromium Trioxide (CrO_3)

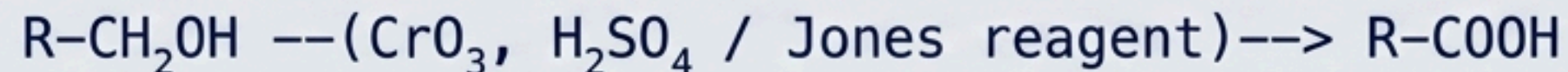
Conditions:

Acidic media.

Profile:

Forms "Jones Reagent" when combined with H_2SO_4

Reaction Strip



Select the reagent based on desired reaction conditions; all three successfully drive primary alcohols straight to carboxylic acids.



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

$$E=mc^2$$



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- » Climb the Leaderboard Among Fellow Aspirants
- » Practice Unlimited MCQs for NEET & JEE
- » Get Clear Explanations, Not Just Marks
- » Track Your Performance Smarter



Side-Chain Oxidation to Benzoic Acid

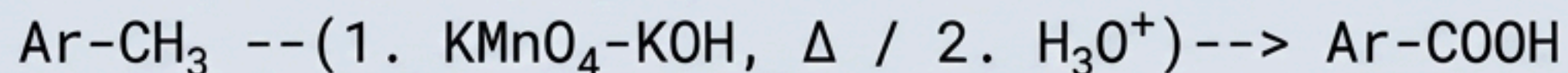


✓ The Rule

The entire side chain is oxidized to a carboxyl group, completely regardless of the carbon chain length.

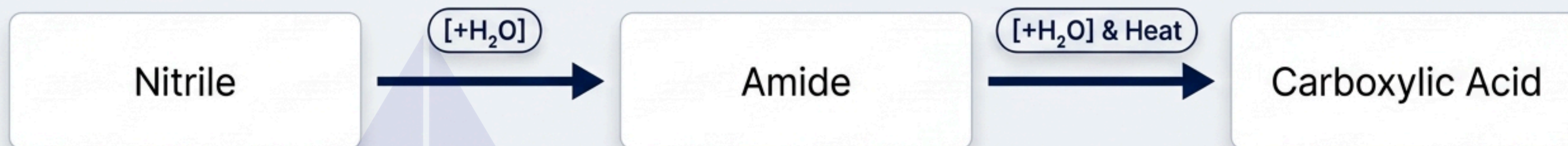
! Exam Alert!

Primary and secondary alkyl groups are easily oxidized. **Tertiary alkyl groups** are **NOT** affected.



A powerful method for producing aromatic carboxylic acids, utilizing aggressive oxidation to strip away complex side chains.

Hydrolysis of Nitriles and Amides



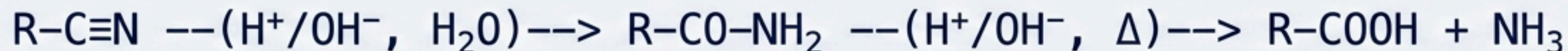
Step 1: Nitrile to Amide

Requires an H^+ or OH^- catalyst. The reaction can be deliberately stopped at the amide stage by using mild reaction conditions.

Step 2: Amide to Acid

Subjecting the amide to further hydrolysis with heat yields the carboxylic acid alongside ammonia (or an amine).

Reaction Strip



A progressive, step-wise hydrolysis pathway converting nitrogen-bonded carbons into carboxyl groups.

Grignard Reagents & Dry Ice



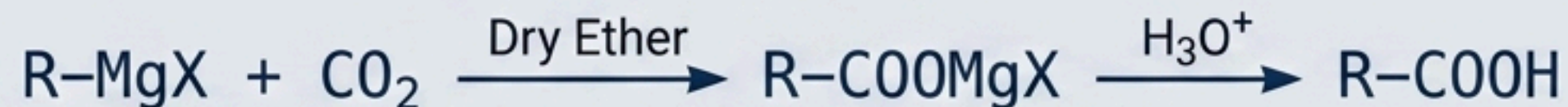
The Mechanism

Grignard reagents attack solid carbon dioxide (dry ice) in dry ether to form a carboxylate salt intermediate.

The Advantage

"Ascends the series." This is the ultimate tool to convert an alkyl halide into a carboxylic acid possessing one more carbon atom than the starting material.

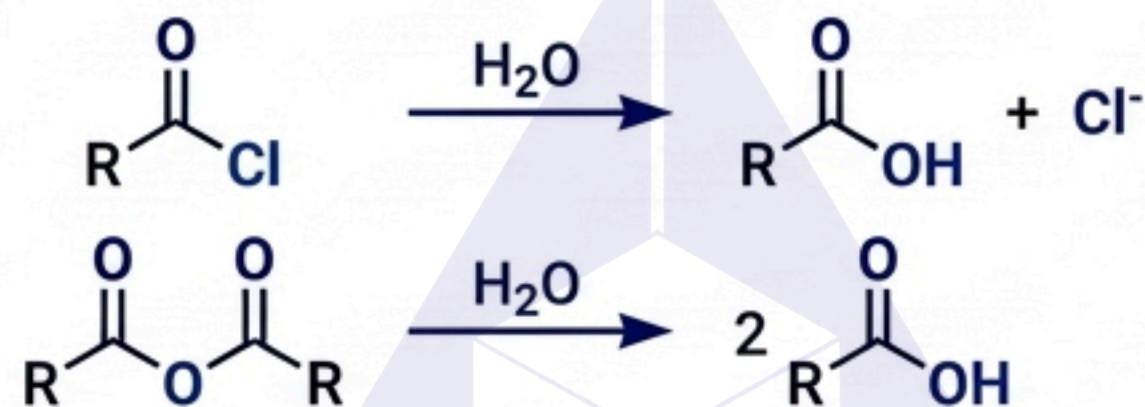
Reaction Strip



The primary synthetic route for lengthening a carbon chain while simultaneously establishing a carboxylic acid functional group.

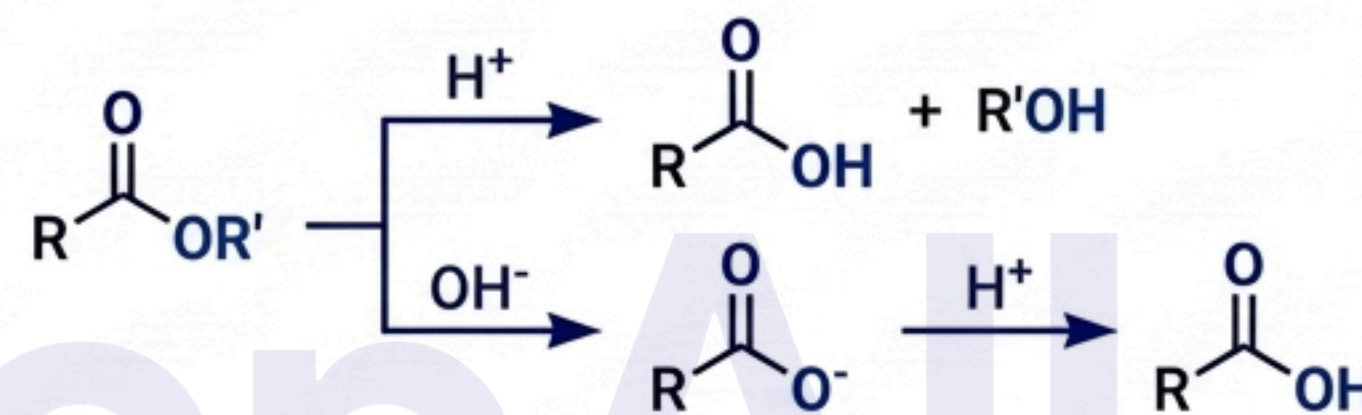
Reclaiming Acids from Derivatives

Acid Chlorides & Anhydrides

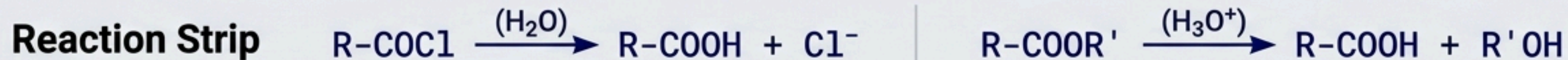


Hydrolyze readily with simple water. Aqueous base accelerates this to give carboxylate ions (requires final acidification).

Esters

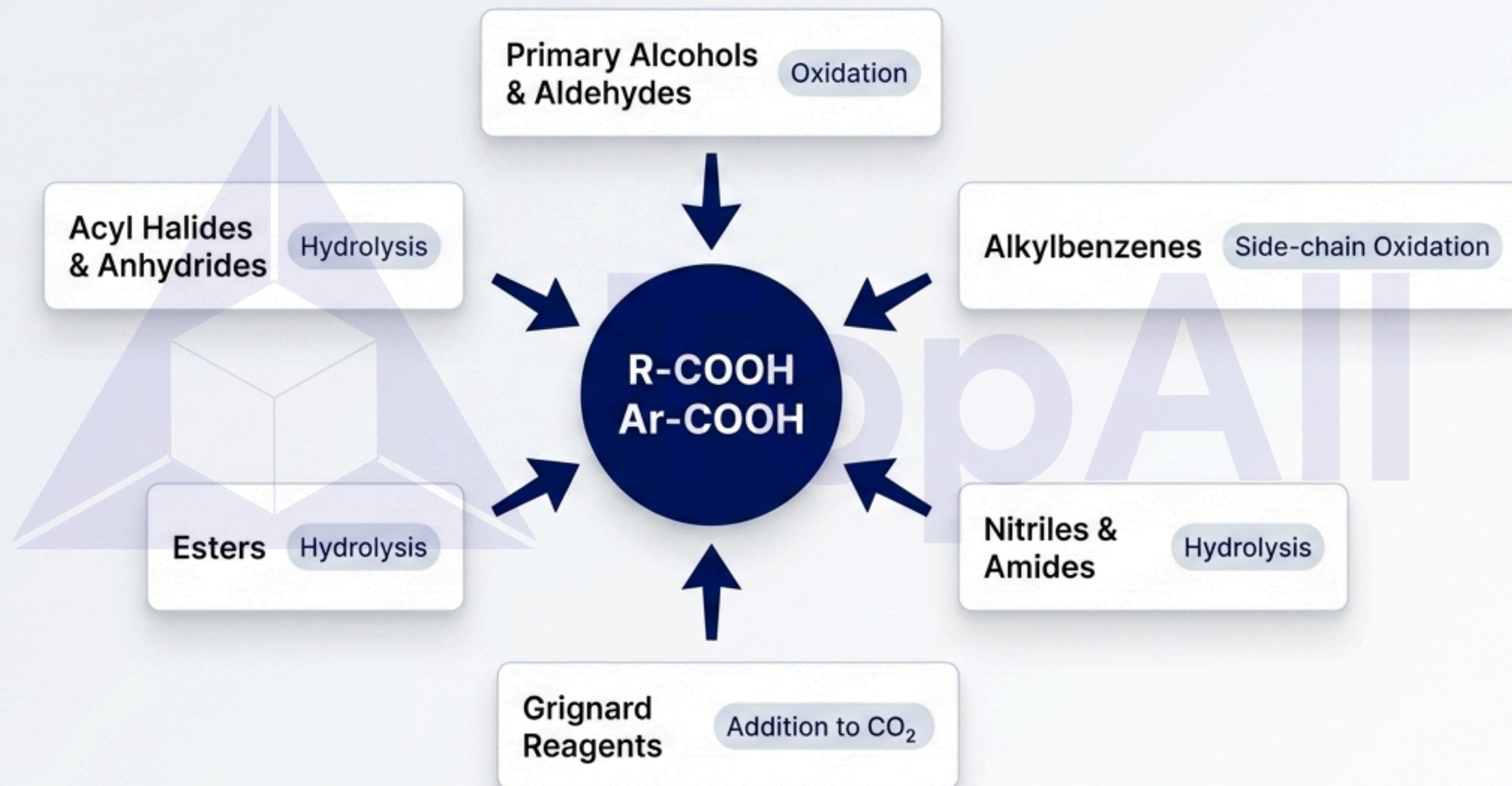


Acidic hydrolysis yields the acid directly. Basic hydrolysis (saponification) yields carboxylate salts, requiring a second acidification step.



Breaking down functional groups derived from carboxylic acids returns them to their original acidic state via simple or catalyzed hydrolysis.

The Carboxylic Acid Preparations



Master this map to instantly recall the starting materials and reagents required to synthesize carboxylic acids.



You've Learned the Theory.

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