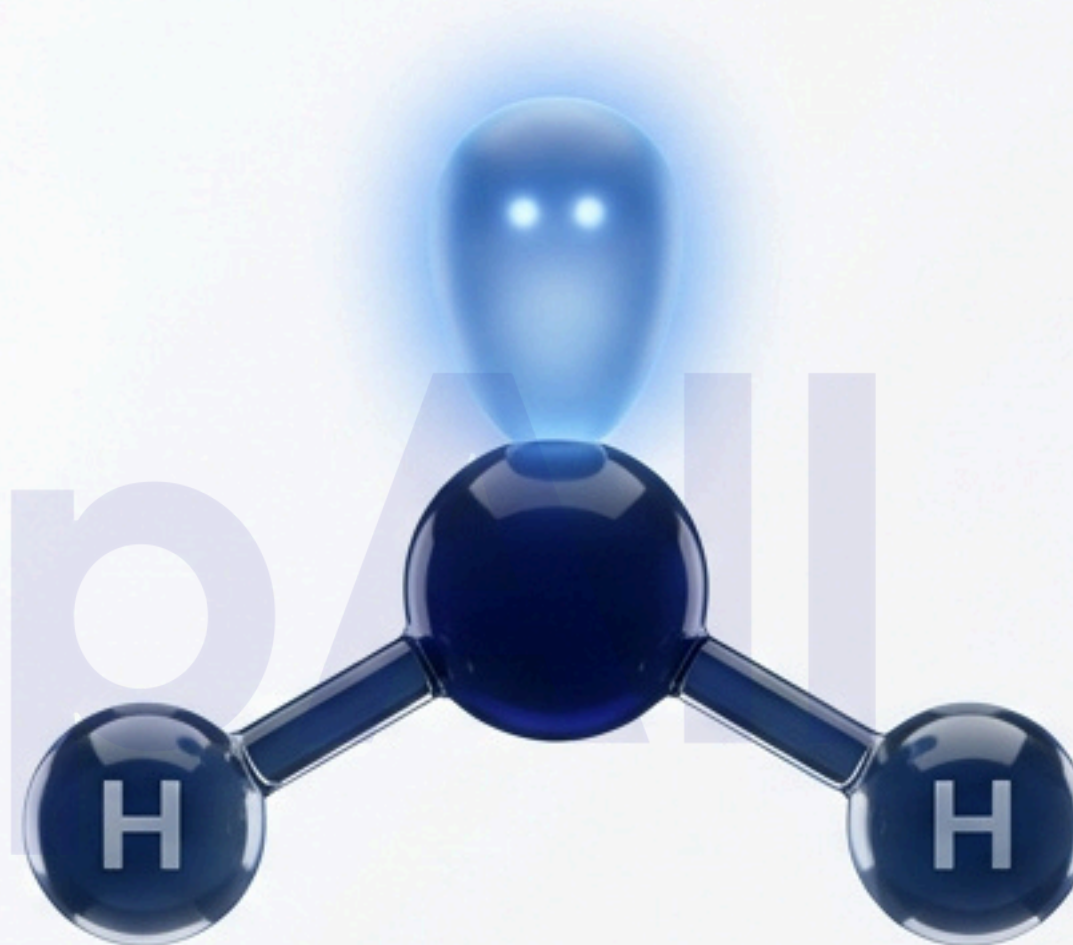


CHAPTER 9 | AMINES

9.4 Preparation of Amines

The Chemist's Toolkit for Amine Synthesis & Carbon Accounting.

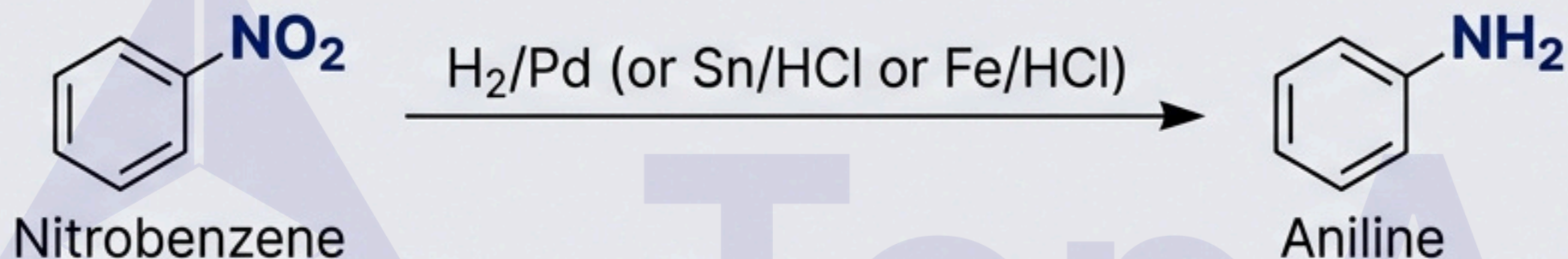
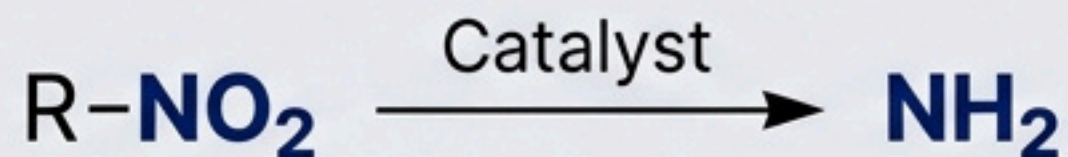


Reaction Mechanisms

Reagent Selection

Carbon Chain Ascent/Descent

Reduction of Nitro Compounds



Catalytic Route

H₂ gas + finely divided Ni, Pd, or Pt. Also effective for nitroalkanes.

Acidic Metal Route

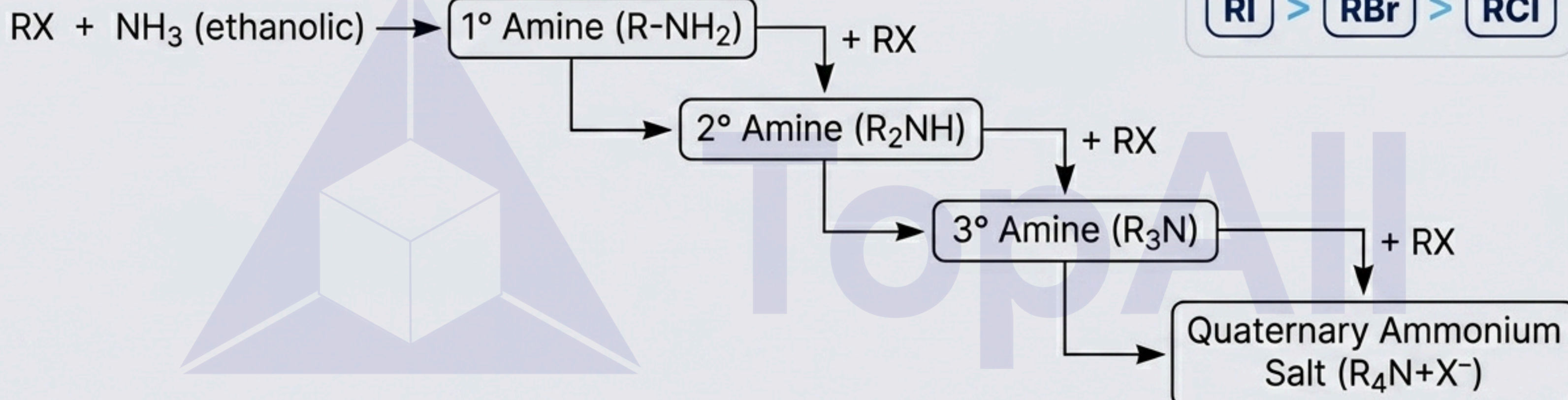
Metals (Sn or Fe) in an acidic medium (HCl).

Exam Insight Why is Fe/HCl preferred over Sn/HCl?

FeCl₂ formed during the reaction gets hydrolysed to release HCl. Thus, only a tiny initial amount of HCl is required to start the reaction.

Ammonolysis of Alkyl Halides

Reaction Cascade Flowchart



⚠ The Mixture Issue

Ammonolysis yields an inseparable mixture of 1°, 2°, 3° amines, and quaternary salts.

To isolate 1° Amine as major product: Use a large excess of NH_3 .



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



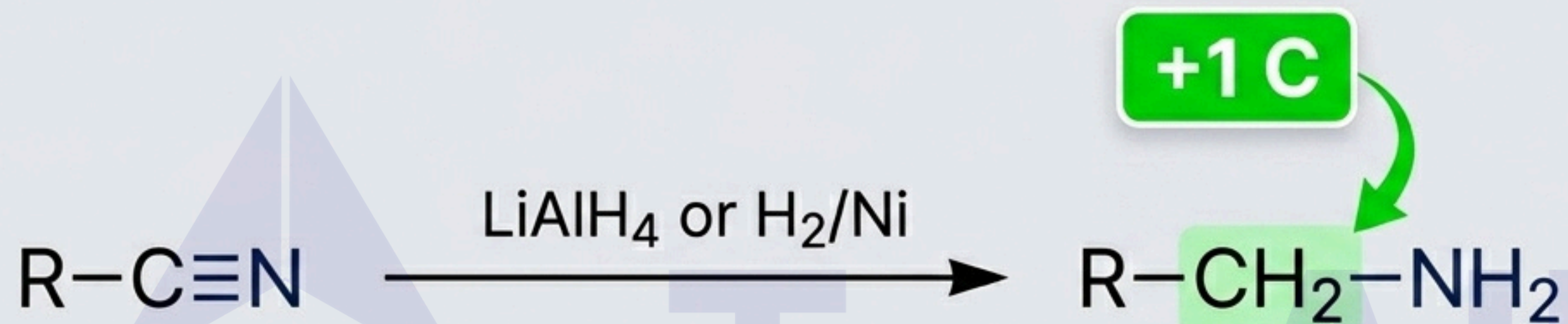
At prep.topall.app

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



Reduction of Nitriles



Ascent of Series

This reaction specifically adds one extra carbon atom to the amine compared to the starting alkyl chain. Critical for step-up synthetic pathways.

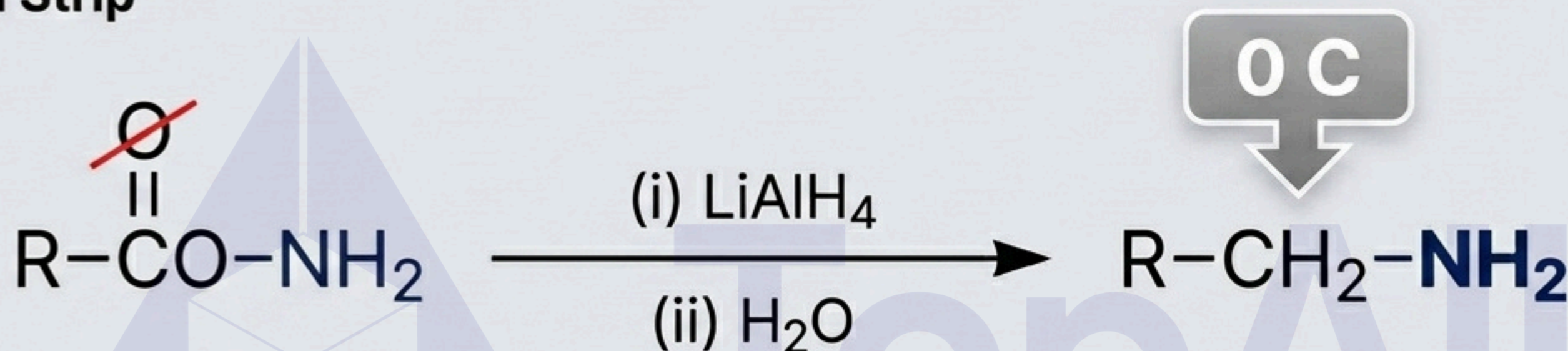
Reagents

Lithium aluminium hydride (LiAlH_4)

Catalytic Hydrogenation (H_2/Ni)

Reduction of Amides

Reaction Strip



Structural Preservation

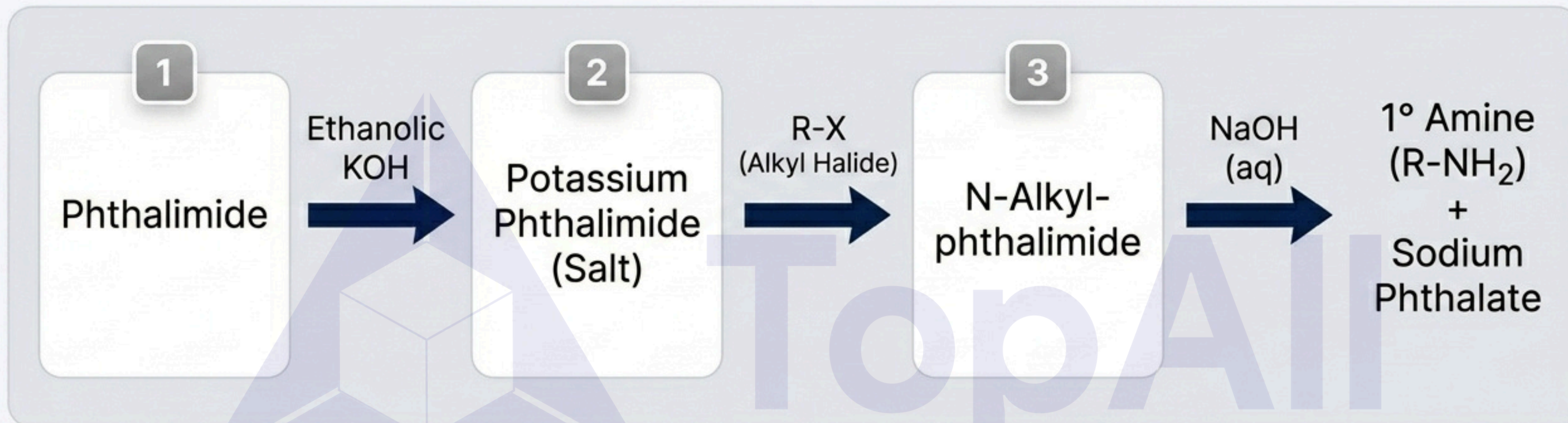
The carbonyl oxygen is fully reduced, leaving the carbon skeleton exactly intact with no change in total carbon count.

Reaction Protocol

Primary Agent: Lithium aluminium hydride (LiAlH_4).

Follow-up: Requires subsequent hydrolysis (H_2O).

Gabriel Phthalimide Synthesis



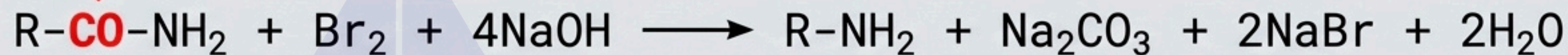
Pure 1° Amines

Exclusively prepares primary aliphatic amines without secondary or tertiary contamination.

Aryl Halides Fail

Cannot prepare aniline or aromatic primary amines. Aryl halides do not undergo nucleophilic substitution with the bulky phthalimide anion.

Hoffmann Bromamide Degradation

-1 C

The Mechanism

Migration of an alkyl or aryl group from the carbonyl carbon directly to the nitrogen atom.

Descent of Series

The amine formed contains exactly one carbon LESS than the starting amide. This is the ultimate tool for stepping down a carbon chain length in synthesis.

The Amine Preparation Matrix

Starting Material	Reagent	Amine Yielded	Carbon Shift
Nitro (R-NO ₂)	H ₂ /Pd or Fe/HCl	1° Amine	0 C
Alkyl Halide (RX)	NH ₃ (excess)	1° (major) + Mix	0 C
Nitrile (R-CN)	LiAlH ₄	1° Amine	+1 C (Ascent)
Amide (R-CONH ₂)	LiAlH ₄	1° Amine	0 C
Phthalimide	KOH → RX → NaOH	Pure Aliphatic 1°	0 C
Amide (R-CONH ₂)	Br ₂ + NaOH	1° Amine	-1 C (Descent)



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