

UNIT 8 • ALDEHYDES, KETONES AND CARBOXYLIC ACIDS

Preparation of Ketones: Acyl Chlorides, Nitriles & Friedel-Crafts Acylation.

Key Vocabulary: The Chemical Tools

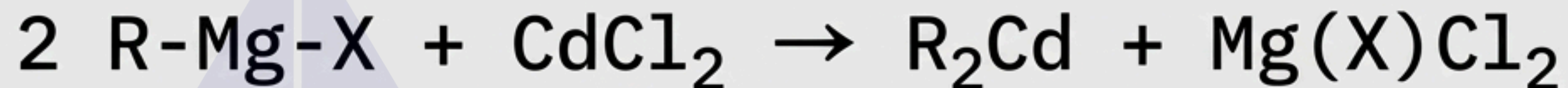
Dialkylcadmium

An organometallic compound (R_2Cd) explicitly synthesized to react with acyl chlorides. It is carefully chosen because it is reactive enough to form a ketone, but not reactive enough to attack the resulting ketone further.

Friedel-Crafts Acylation

An electrophilic aromatic substitution reaction. It specifically uses an anhydrous Lewis acid catalyst (like $AlCl_3$) to attach an acyl group directly to a benzene ring.

Route A: Acyl Chlorides + Dialkylcadmium



Step 1: Grignard reagent reacts with cadmium chloride to synthesize the tool.



Step 2: Dialkylcadmium replaces the chloride, yielding the Ketone.



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Let's Test Them Now.**

$$E=mc^2$$



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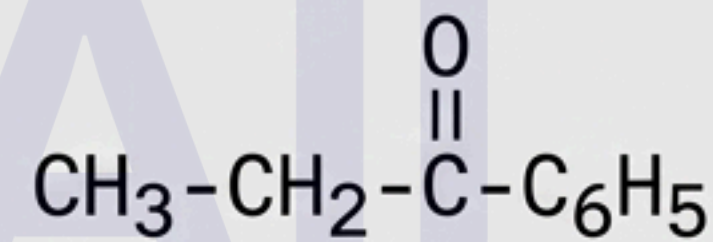
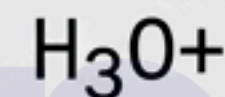
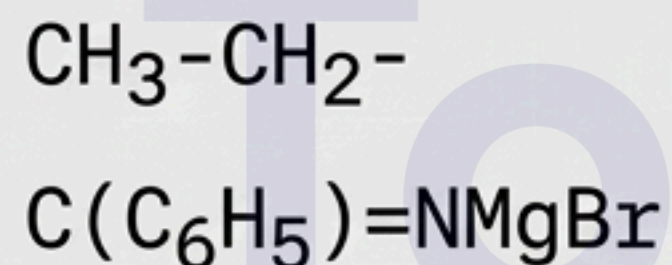
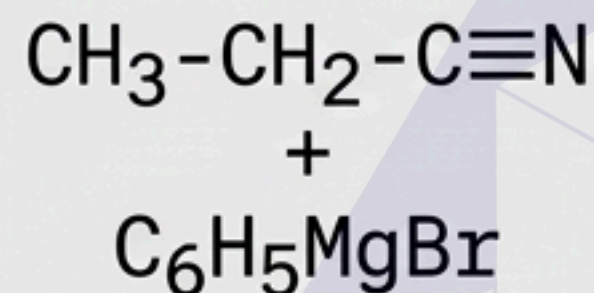
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Key Highlights

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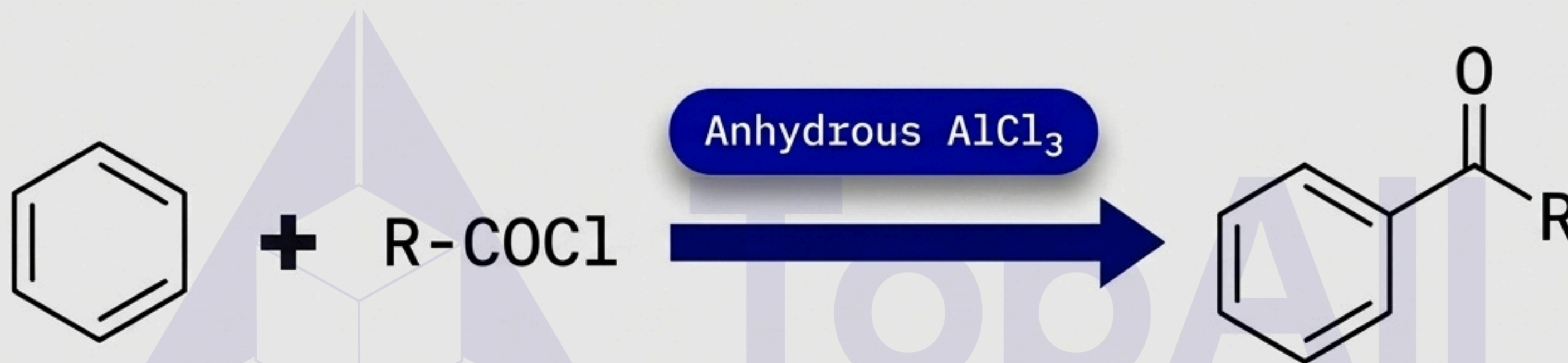
Route B: Nitriles + Grignard Reagent



Addition across the triple bond forms an imine salt intermediate.

Crucial Step:
Acid hydrolysis cleaves the nitrogen, leaving the target Ketone.

Route C: Friedel-Crafts Acylation



The anhydrous Lewis acid catalyst is non-negotiable—it generates the vital acylium ion electrophile.

JEE Concept Dependency

Watch for this hidden precursor:

Grignard Reagent
(R-Mg-X)



Used DIRECTLY in Route B (Nitriles).

Used INDIRECTLY in Route A
(To manufacture Dialkylcadmium).

Advanced MCQs will test this lineage. Even though Route A uses Acyl Chlorides and Dialkylcadmium, the starting chemical reality is that *both* Route A and Route B trace their origins back to a Grignard reagent.

Synthesis Map: Ketones

Key Takeaways

- Three distinct paths to Ketones: Route A requires Acyl Chlorides + Dialkylcadmium; Route B requires Nitriles + Grignard (then hydrolysis); Route C requires Benzene + Acid Chloride + Anhydrous AlCl_3 .
- Chemical Strategy: Dialkylcadmium is used in Route A instead of a Grignard reagent directly because it is selectively reactive. It creates the ketone but stops there, preventing the unwanted formation of a tertiary alcohol.



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