

**B.Sc. Semester-II
Core Course-III (CC-III)
Organic Chemistry-I**



IV. Aromatic Hydrocarbons

7. The Friedel-Crafts Alkylation Reaction



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IV Aromatic Hydrocarbons

10 Lectures

Aromaticity: Hückel's rule, aromatic/anti-aromatic/non-aromatic character of arenes, cyclic carbocations/carbanions and heterocyclic compounds with suitable examples.

Electrophilic aromatic substitution: Halogenation, Nitration, Sulphonation and Friedel-Craft's alkylation/acylation with their mechanism. Directing effects of mono-functional groups.

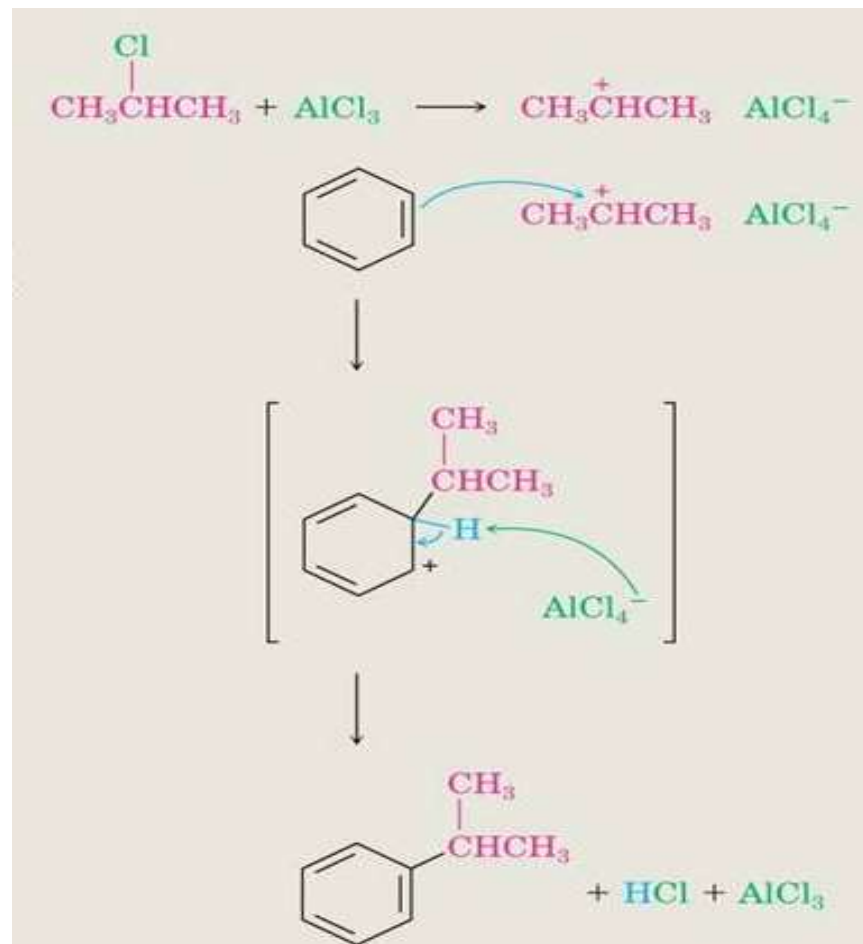
Coverage:

1. The Friedel-Crafts Alkylation Reaction

The Friedel-Crafts Alkylation Reaction

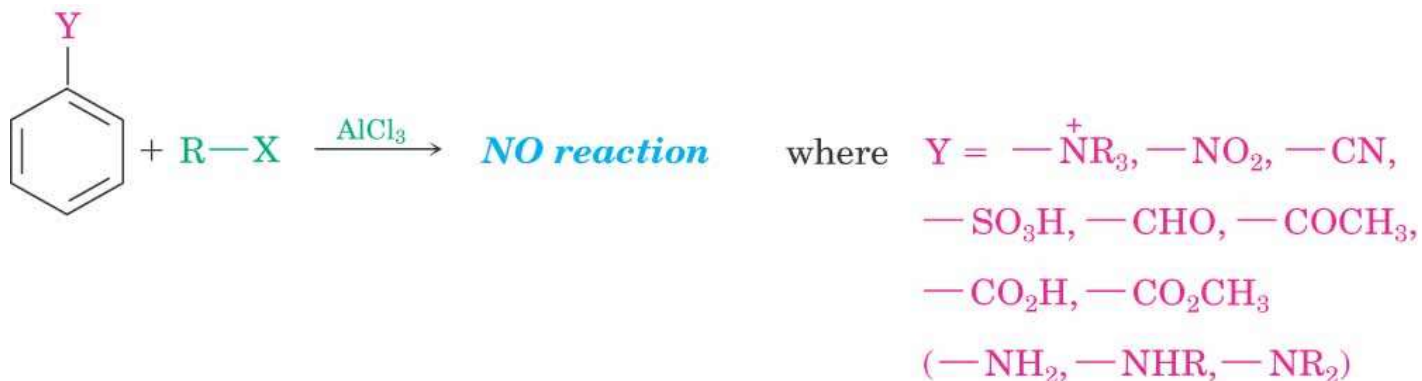
Mechanism:

- Aromatic substitution of a R^+ for H
- Aluminum chloride promotes the formation of the carbocation
- Wheland intermediate forms

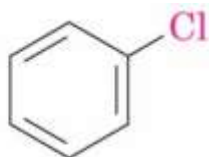


Limitations of the Friedel-Crafts Alkylation

- Only *alkyl* halides can be used (F, Cl, I, Br)
- *Aryl* halides and *vinyllic* halides do not react (their carbocations are too hard to form)
- Will not work with rings containing an amino group substituent or a strongly electron-withdrawing group



An aryl halide

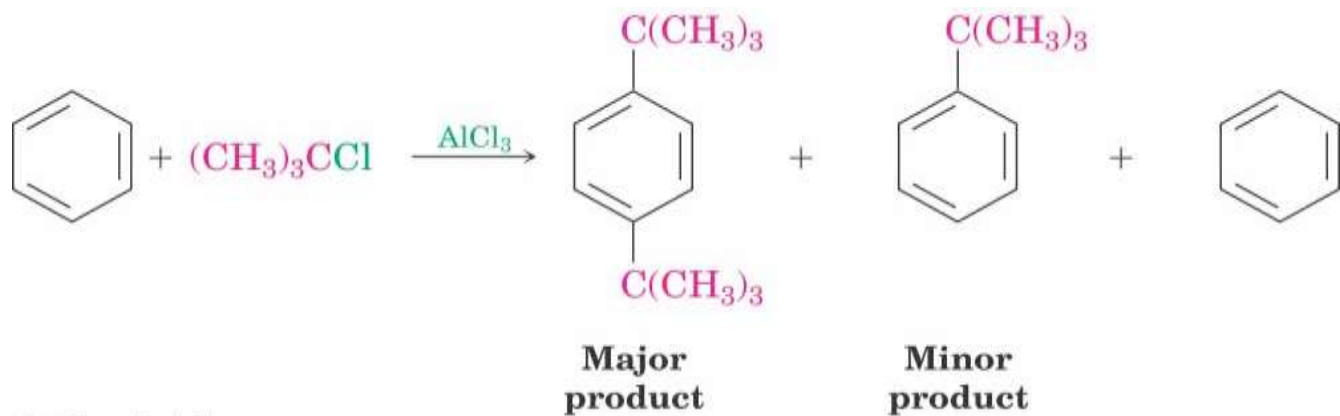


A vinyllic halide

NOT reactive

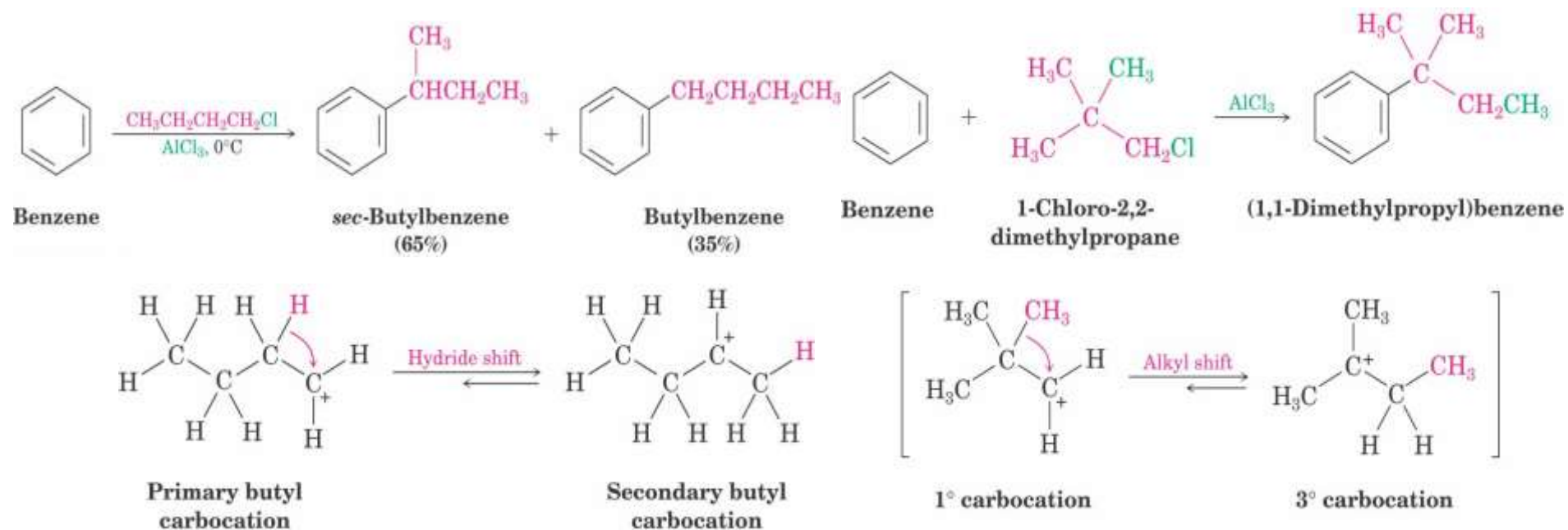
Control Problems

- Multiple alkylations can occur because the first alkylation is activating



Carbocation Rearrangements During Alkylation

- Similar to those that occur during electrophilic additions to alkenes
- Can involve H or alkyl shifts



Thank You



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