Friedel-Crafts

A) Alkylation

Think of as discrete carbocation that can rearrange

HCI AICI₃

B) Acylation

Comparison of Acylation vs. Alkylation

Acyl Group

~ deactivating: will only react once

~ no rearrangements

Alkyl Group

~ activating: may react more than once to give disubstituted benzene

~ will rearrange to form most stable carbocation

Acylation is more reliable in synthesis

Note that acyl ketone can be reduced to alkyl benzene

$$\begin{array}{c|c} O \\ R & \begin{array}{c} H_2 \\ \hline Pd \end{array} \end{array} \begin{array}{c} R \end{array} \begin{array}{c} \text{we'll talk more about this} \\ \text{during section on carbonyls} \end{array}$$

note: O R
$$H_2$$
 R nitro group is REDUCED to AMINE NO_2 NH_2

Synthesis Examples

Keep in Mind

Note that the Lewis acid AICl₃ can complex with certain functional groups and kill the reaction.

Strongly e- withdrawing substituents on benzene will deactivate ring and prevent Friedel-Crafts

$$\begin{array}{c|c}
 & O \\
\hline
 & NO_2 & \hline
 & AICI_3 & \hline
\end{array}$$
N.R.

Alkylation may yield unexpected products (and mixtures of products) by rearrangement