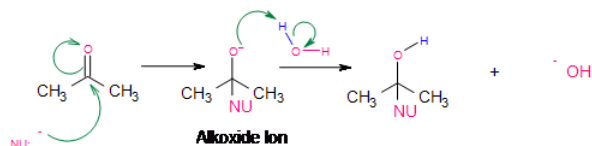


19.15: Reactions of Aldehydes and Ketones—General Considerations

Reaction at the Carbonyl Carbon

Under neutral or basic conditions, nucleophilic attack of the electrophilic carbon takes place. As the nucleophile approaches the electrophilic carbon, two valence electrons from the nucleophile form a covalent bond to the carbon. As this occurs, the electron pair from the pi bond transfers completely over to the oxygen which produces the intermediate **alkoxide ion**. This **alkoxide ion**, with a negative charge on oxygen is susceptible to protonation from a protic solvent like water or alcohol, giving the final addition reaction.

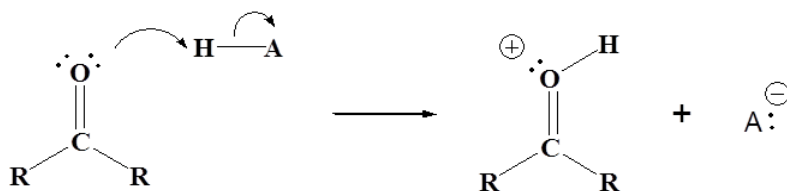


Electrophilic Addition-Protonation

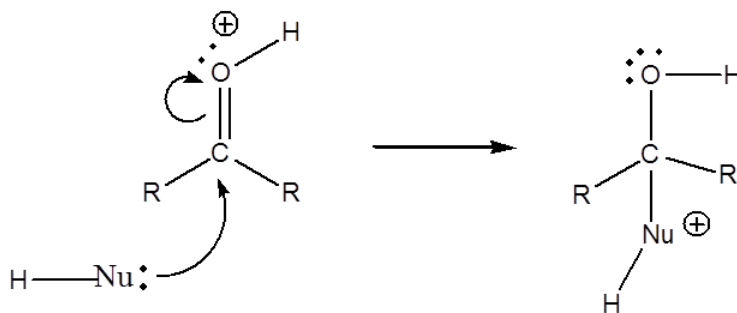
Under acidic conditions, electrophilic attack of the carbonyl oxygen takes place. Initially, protonation of the carbonyl group at the oxygen takes place because of excess H^+ all around. Once protonation has occurred, nucleophilic attack by the nucleophile finishes the addition reaction. It should be noted that electrophilic attack is extremely unlikely, however, a few carbonyl groups do become protonated initially to initiate addition through electrophilic attack. This type of reaction works best when the reagent being used is a very mildly basic nucleophile.

Mechanism

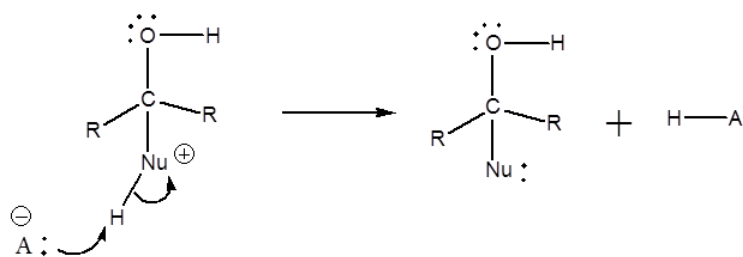
1) Protonation of the carbonyl



2) Nuc addition



3) Deprotonation



Contributors

- Prof. Steven Farmer ([Sonoma State University](#))

19.15: Reactions of Aldehydes and Ketones—General Considerations is shared under a [CC BY-NC-SA 4.0](#) license and was authored, remixed, and/or curated by LibreTexts.