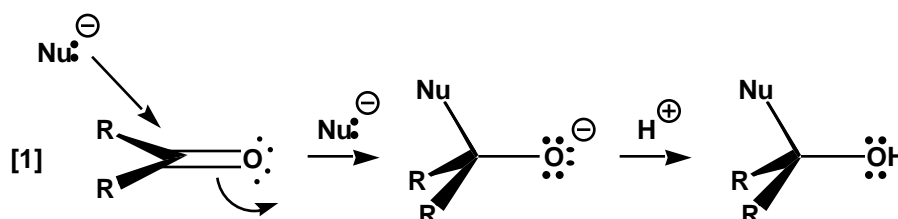


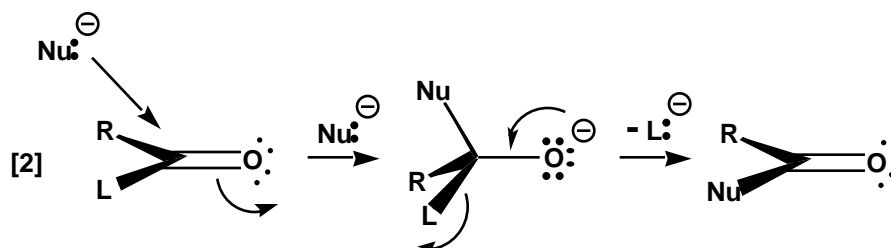
Text Related to Segment 16.04 ©2002 Claude E. Wintner

The fate of a tetrahedral alkylate anion intermediate formed as a result of nucleophilic attack on a carbonyl group depends on the substitution at carbon of the starting carbonyl compound. If there is not a good leaving group — as is the case for aldehydes and ketones, where the substituents on the carbonyl carbon atom are alkyl groups or hydrogen — then the usual initial outcome is protonation at the alkylate oxygen, with the net overall reaction being regiospecific addition of the nucleophile and hydrogen to the carbonyl double bond [1]. (However, we should be careful to keep in mind the qualification implied by the words "usual *initial* outcome," for we shall see cases where there is a subsequent elimination step as well.)

no leaving group: addition



leaving group: substitution



fate of a tetrahedral alkylate anion intermediate depends on the substitution at carbon of the starting carbonyl compound

On the other hand [2], if there is a leaving group on the starting carbonyl compound — as for example in acyl halides and anhydrides, esters and thioesters, or amides — then the commonly observed result is the departure of the leaving group, the carbonyl carbon atom returning to trigonal sp^2 hybridization from tetrahedral sp^3 , so that the net overall result is the substitution of the leaving group by the nucleophile. In general (but again we shall see a qualification of this statement in the sequel), the leaving group will have been a weaker base than the attacking nucleophile.

©2002 Claude E. Wintner