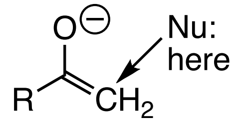
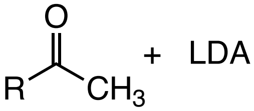
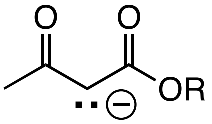
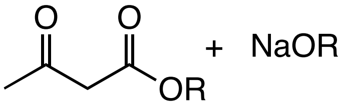
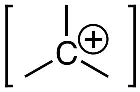
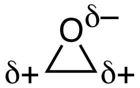
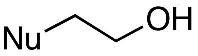
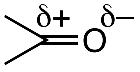
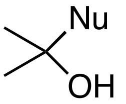
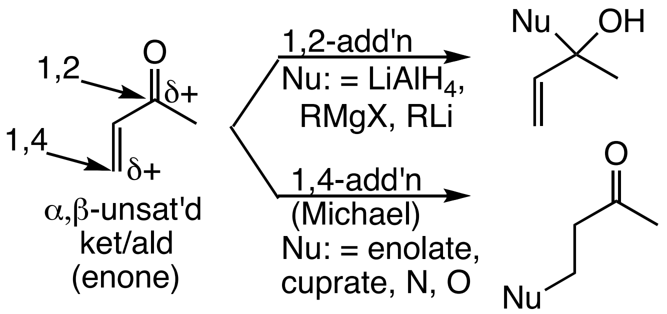
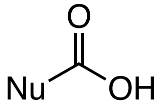
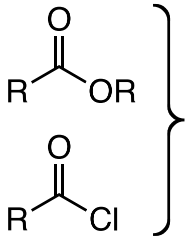
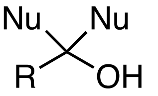
CHM 422 Organic Synthesis, Dr. Laurie S. Starkey
Electrophiles and Nucleophiles

Most organic reactions result from the union of an electron-rich Nucleophile (Nu:) with an electron-poor Electrophile (E^+). Shown below are several Nu: and E^+ that are commonly utilized in organic synthesis.

Nucleophiles (Nu:)	**Reagents/ notes**
$RO^{\ominus}$	ROH + NaH
RNH_2	($RNH^{\ominus}$ is a strong base, not a Nu:)
$NO_2^{\ominus}$, $N_3^{\ominus}$	$NaNO_2$, NaN_3 ⟶ amine synthesis
$I^{\ominus}$	NaI (best halide Nu:)
$H{:}^{\ominus}$	$LiAlH_4$ or $NaBH_4$
$R{:}^{\ominus}$	$RX + Mg \longrightarrow RMgX$ $RX + Li \longrightarrow RLi$ $2\ RLi + Cu \longrightarrow R_2CuLi$
$N{\equiv}C{:}^{\ominus}$	NaCN
$RC{\equiv}C{:}^{\ominus}$	$RC{\equiv}CH + NaNH_2$
 enolate	
$NO_2{-}CH_2{:}^{\ominus}$ $NC{-}CH_2{:}^{\ominus}$	"EWG"$-CH_3$ + LDA (enolate-like Nu:'s)
	

Electrophiles (E^+)	**Notes**
	Can't put this in a bottle! Instead, our E^+ reagents will have δ^+ sites.
$\overset{\delta+}{R}-\overset{\delta-}{X}$	R–Cl, R–Br, R–I (Br–Br)
	
 (ketone/aldehyde)	
	
$\overset{\delta+}{O{=}C{=}O}$ (CO_2)	
	carboxylic acid derivatives generally add 2 eq. of C or H Nu: (addn/elim mech) 

Note: The enolate of acetoacetate is often used as a *synthetic equivalent* of the acetone enolate, since acetone itself typically gives poor yields. The extra C is lost by hydrolysis/decarboxylation.