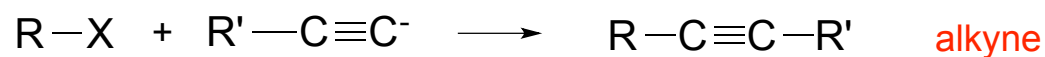
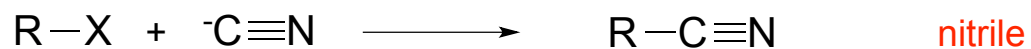
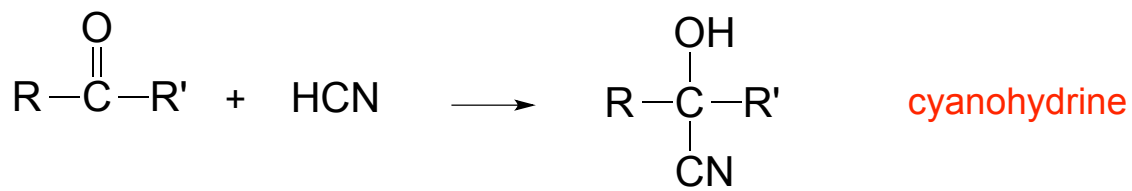
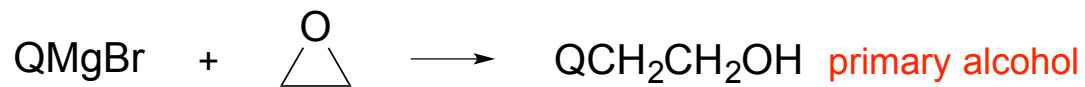
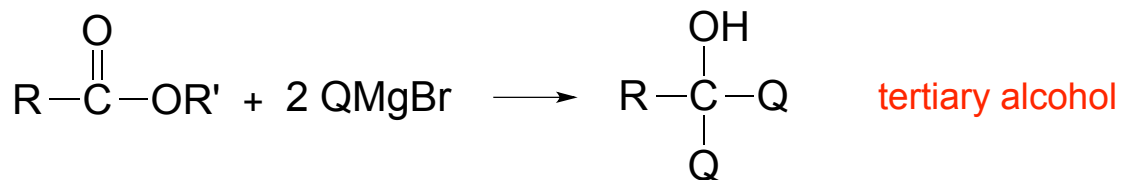
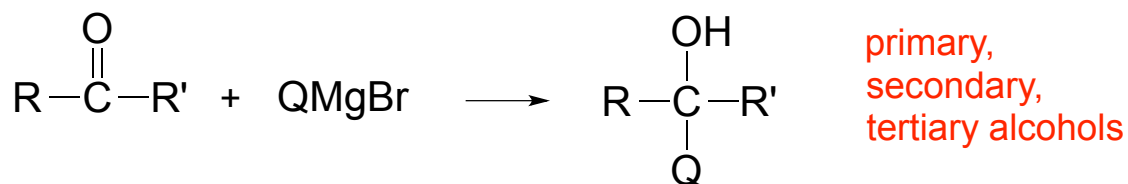


Formation of carbon-carbon bonds

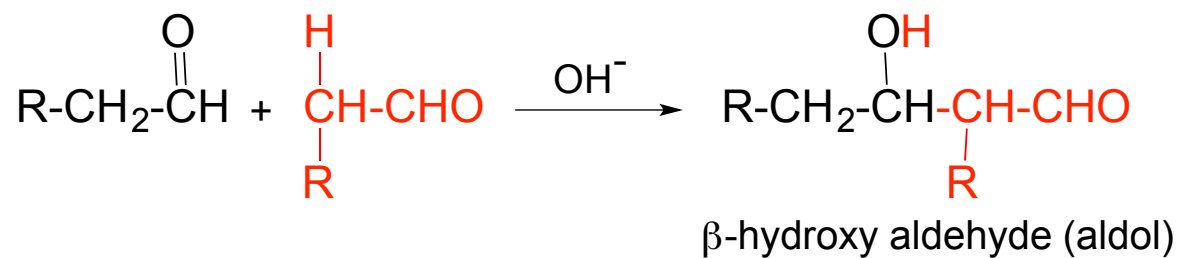
Summary



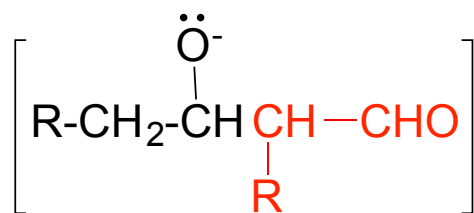
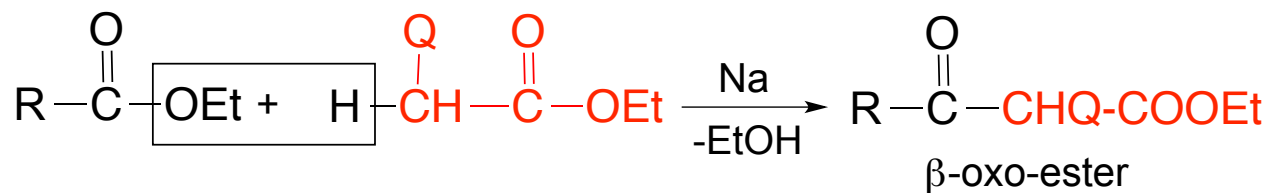
(X pl. Cl, Br, I, OTs, OMs)



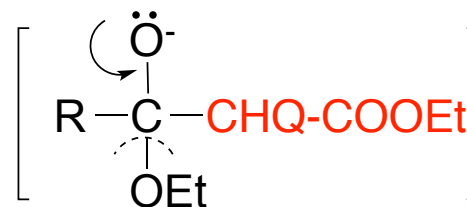
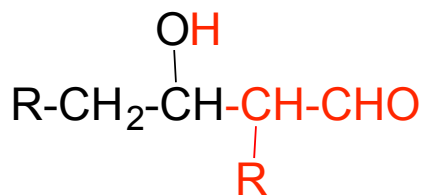
Aldol addition (aldol dimerization)



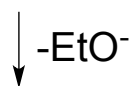
Claisen condensation



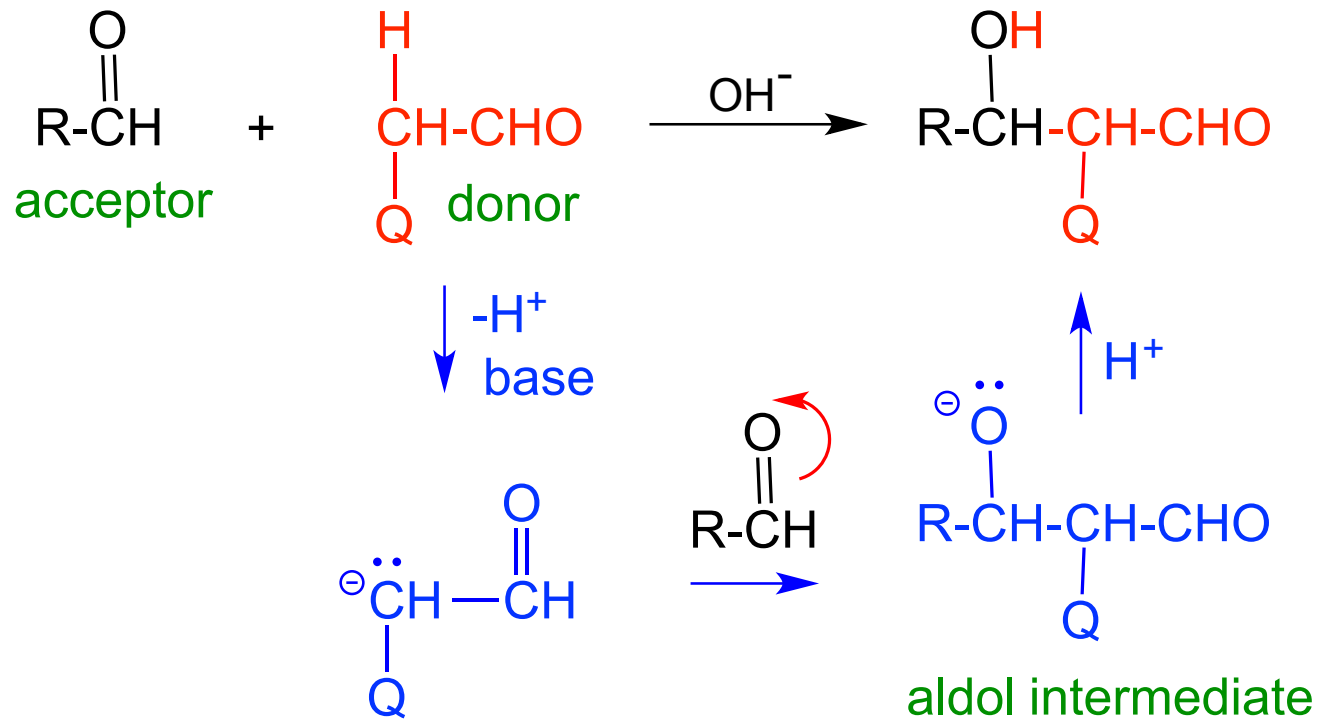
aldol intermediate



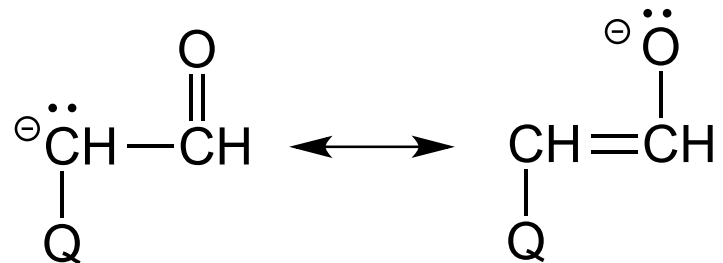
Claisen intermediate



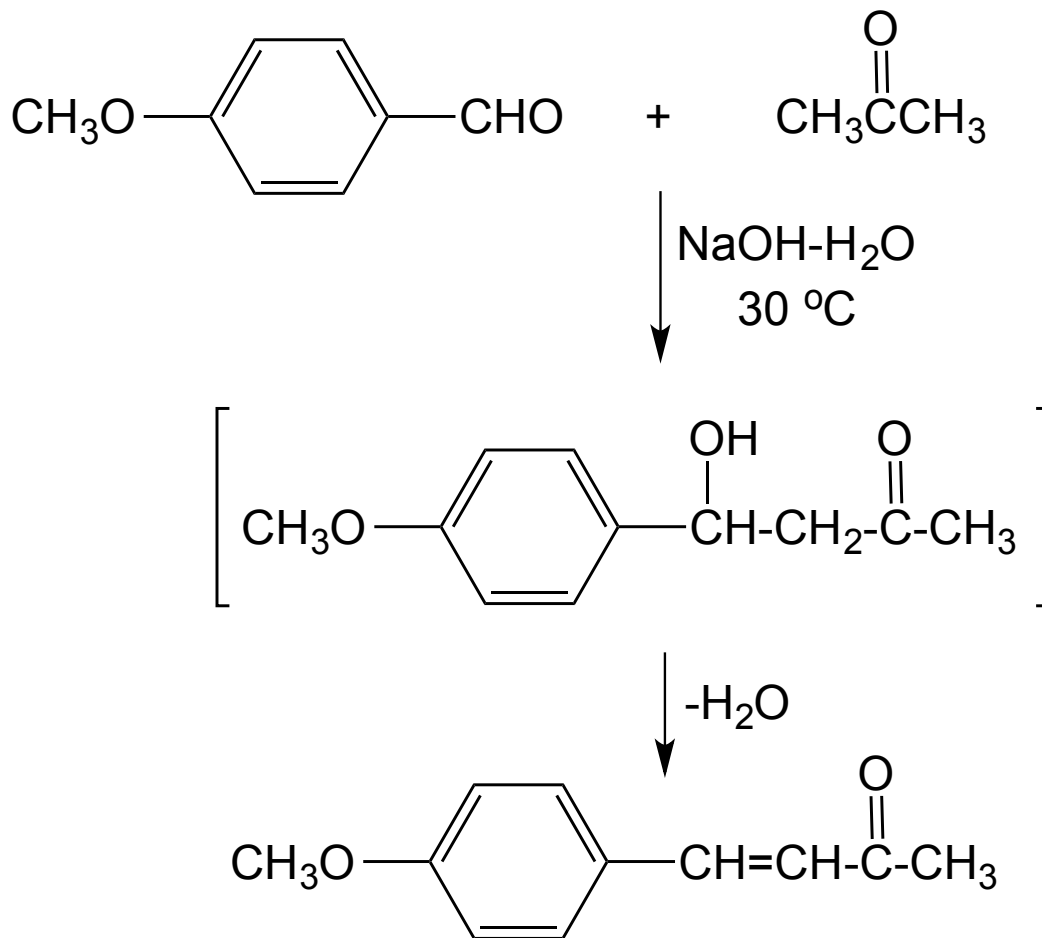
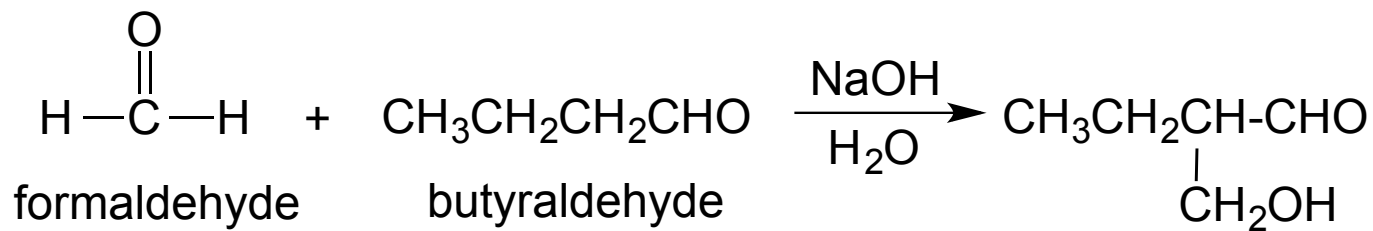
Mixed aldol addition with aldehydes



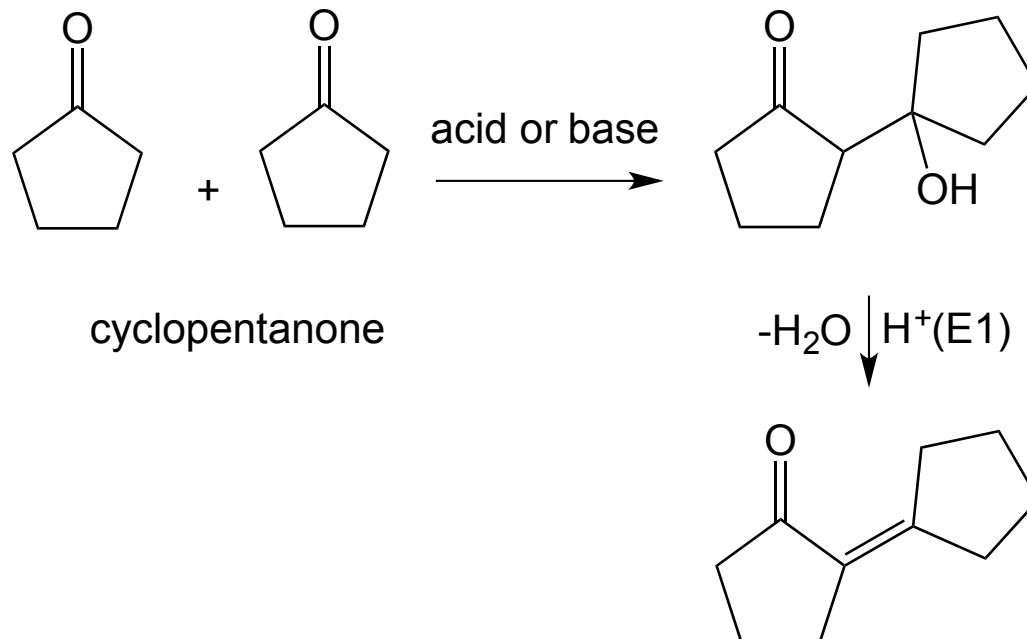
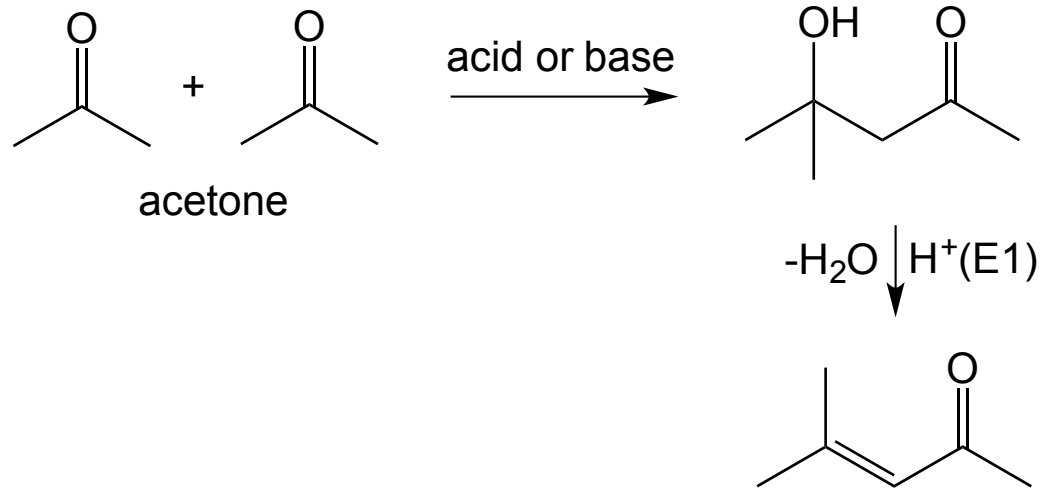
structure of enolate ion



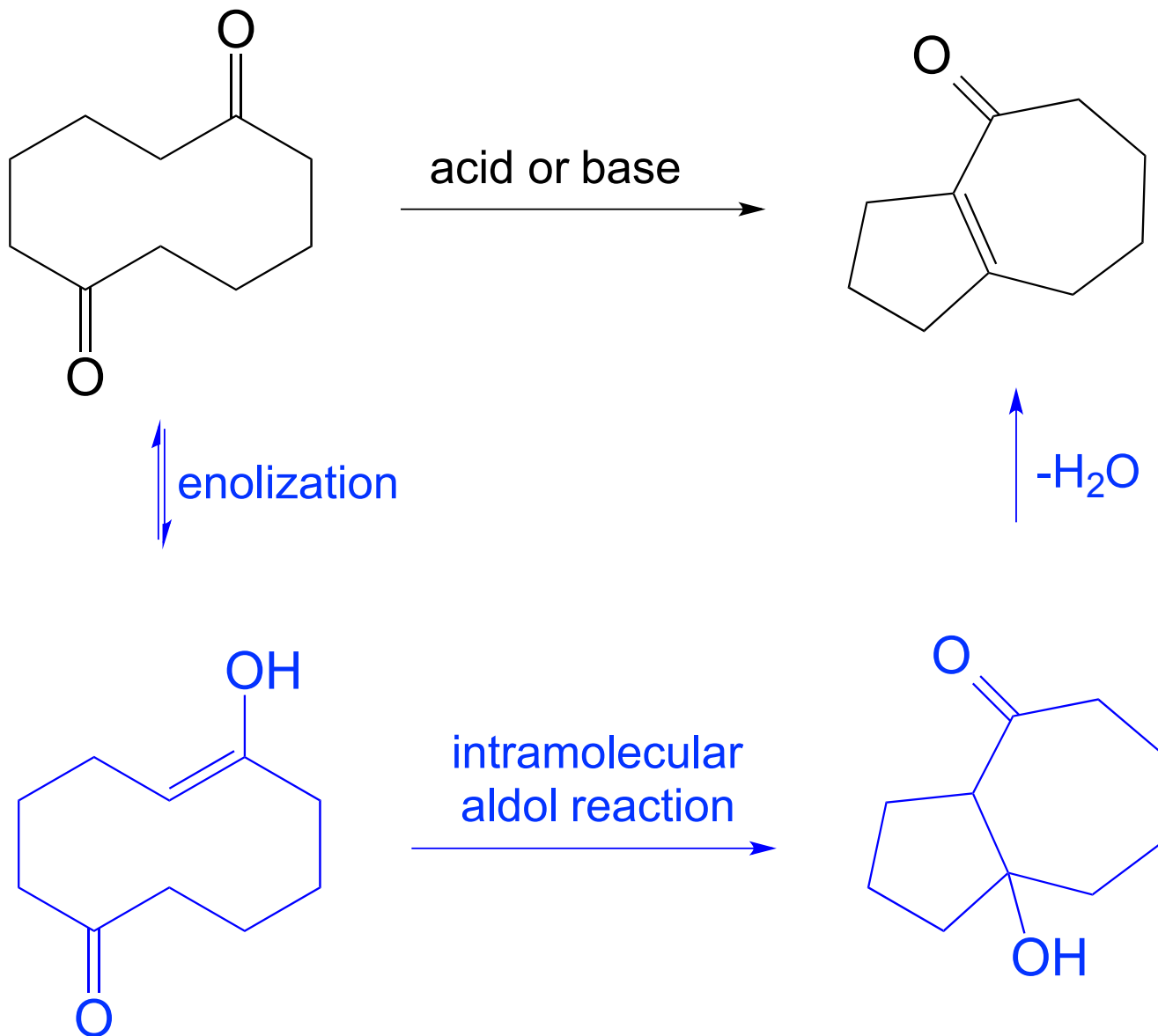
Examples



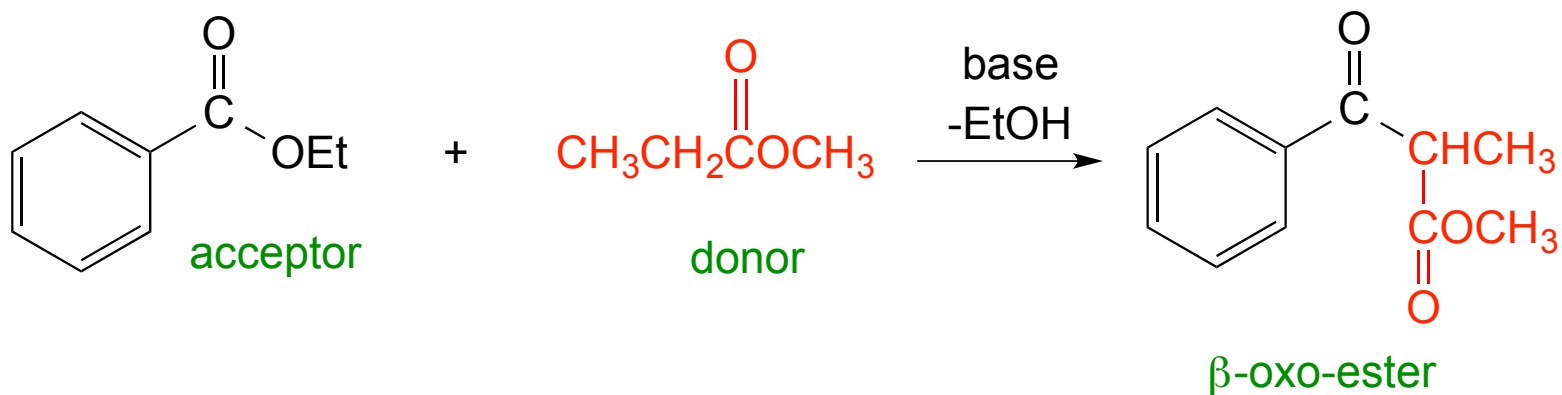
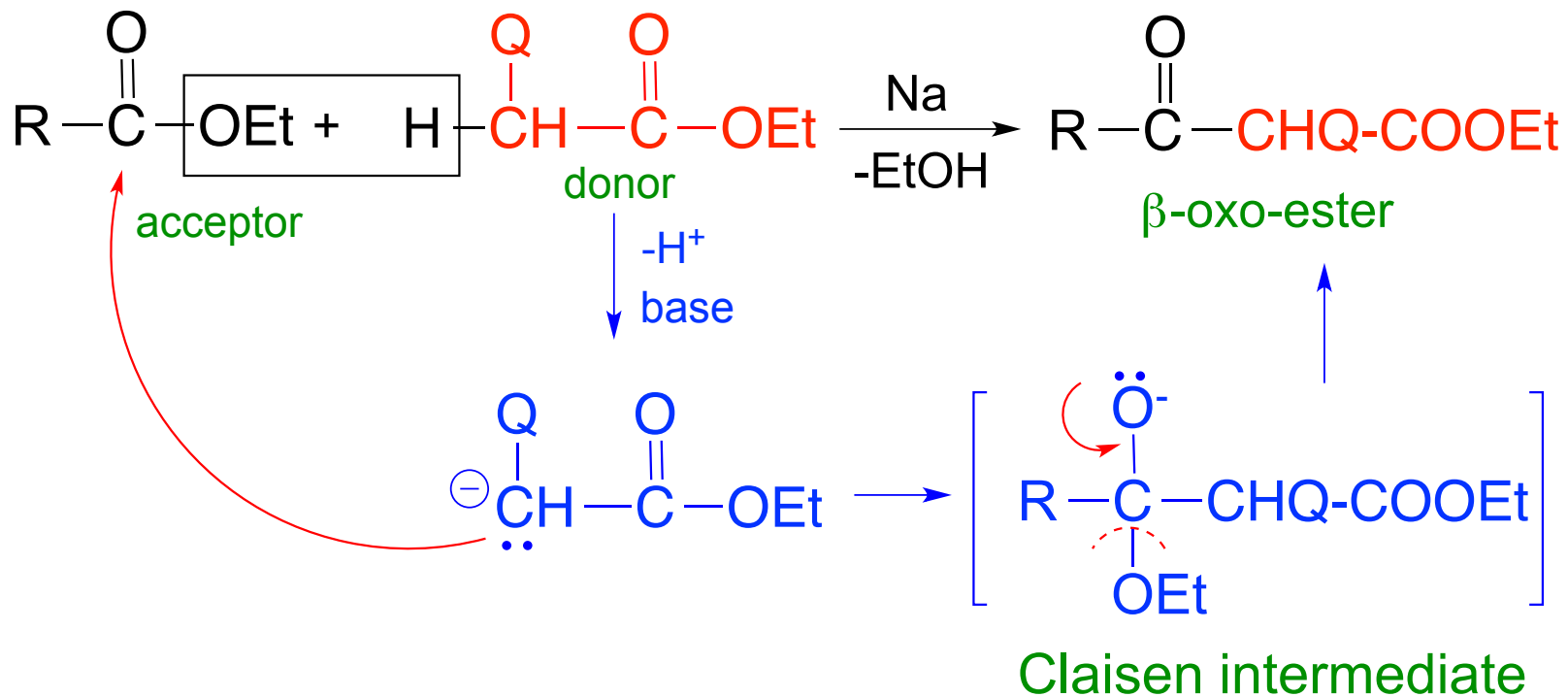
Aldol addition with ketones



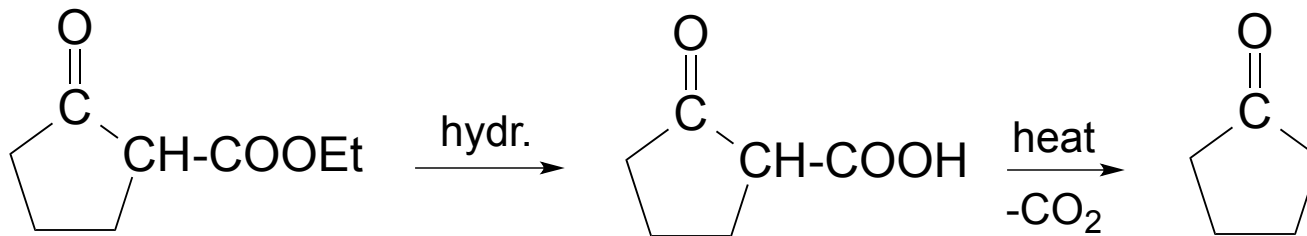
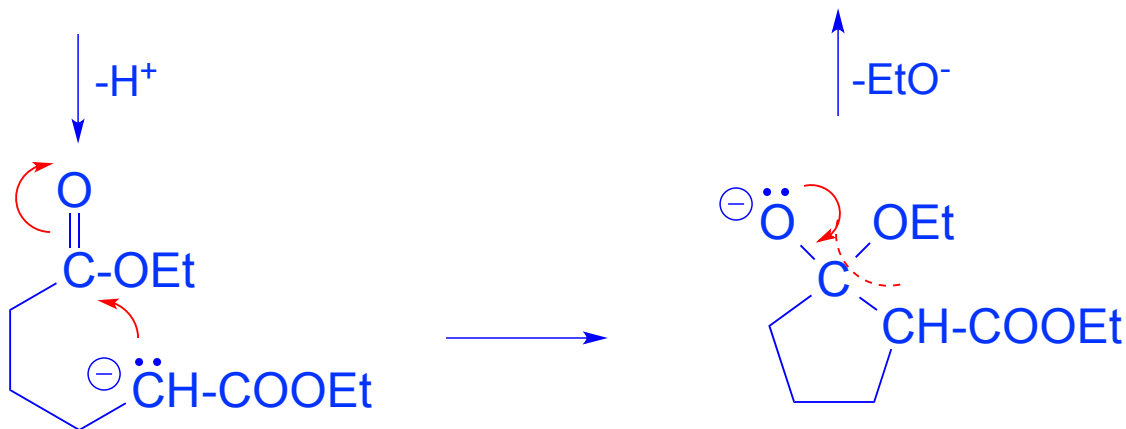
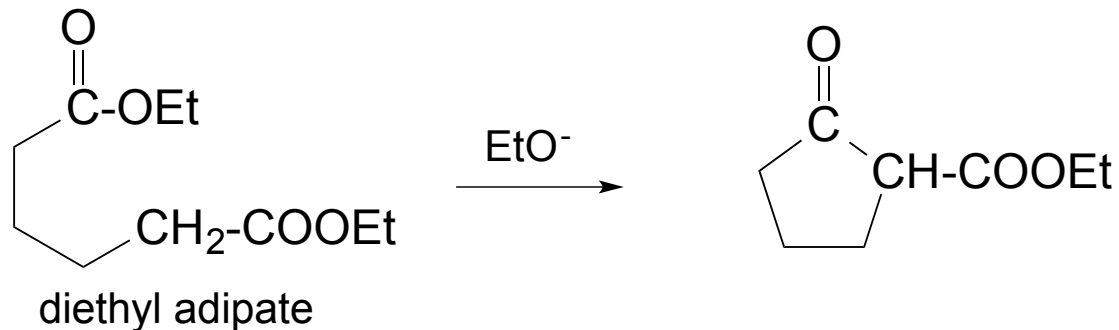
Intramolecular aldol reaction



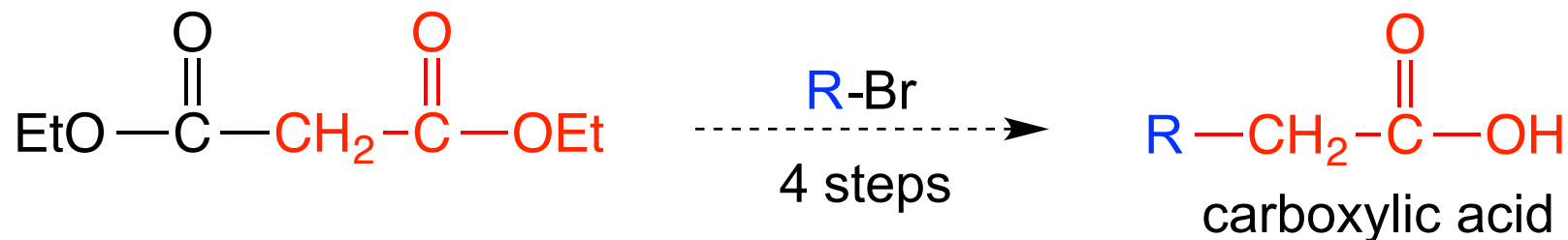
Mixed Claisen condensation



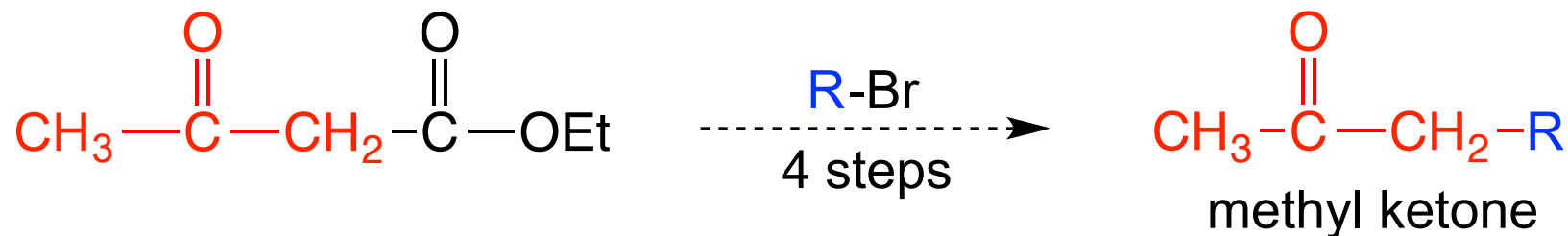
Intramolecular Claisen condensation (Dieckmann condensation)



Malonester synthesis



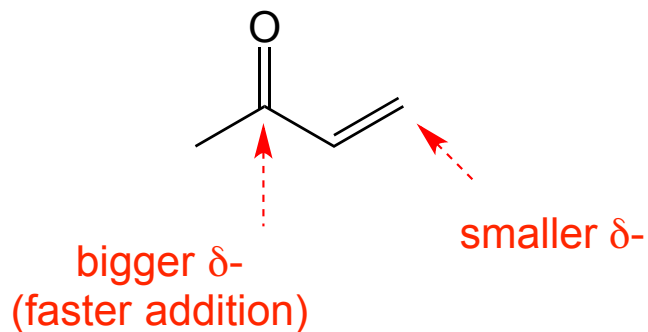
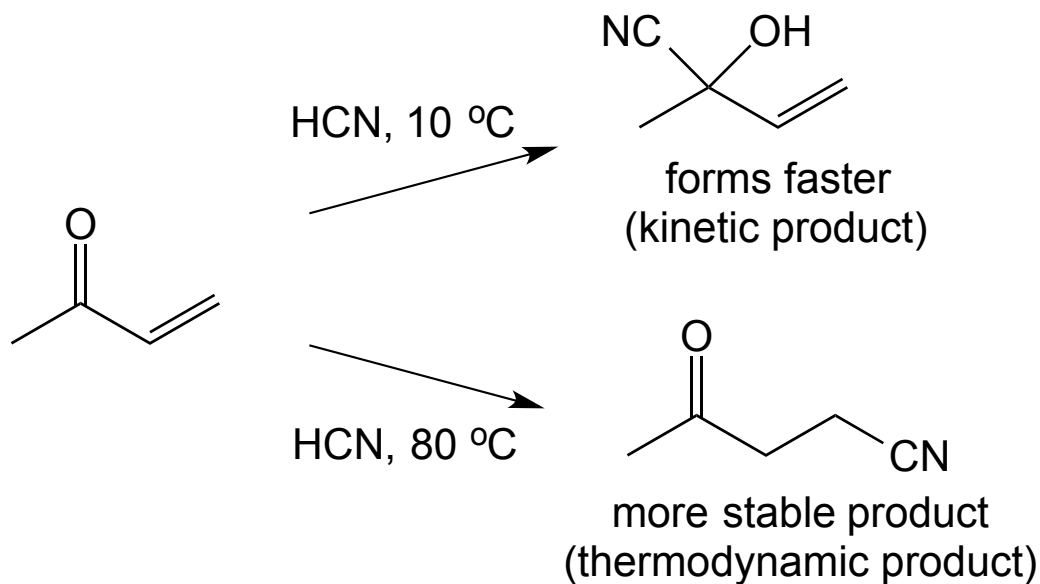
Acetoacetic ester synthesis



4 steps: deprotonation
alkylation
hydrolysis
decarboxylation

Conjugated addition on carbonyl compounds

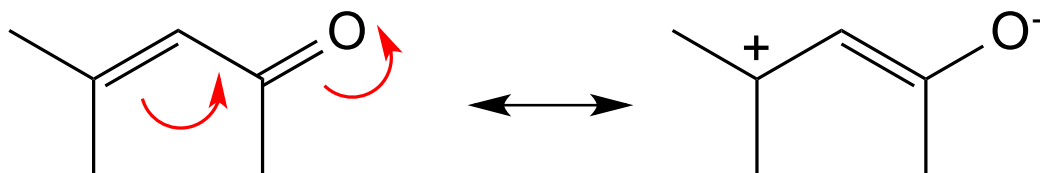
HCN addition



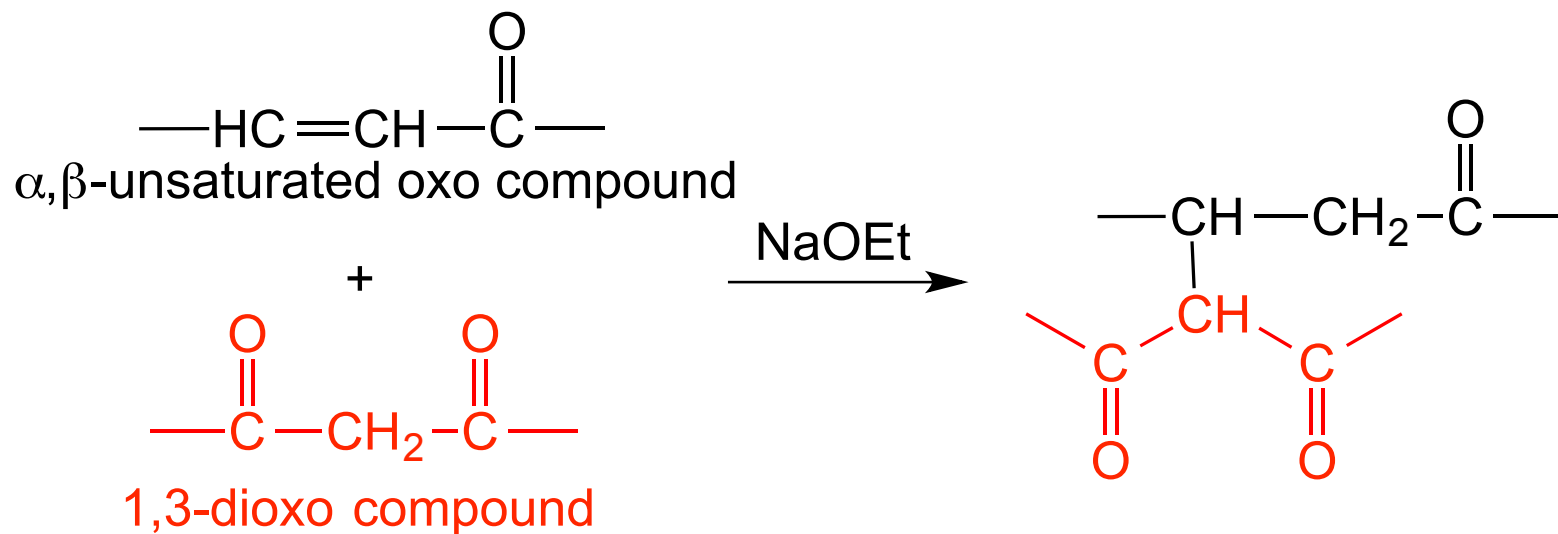
C-O 357 kJ/mol

C=O 748 kJ/mol

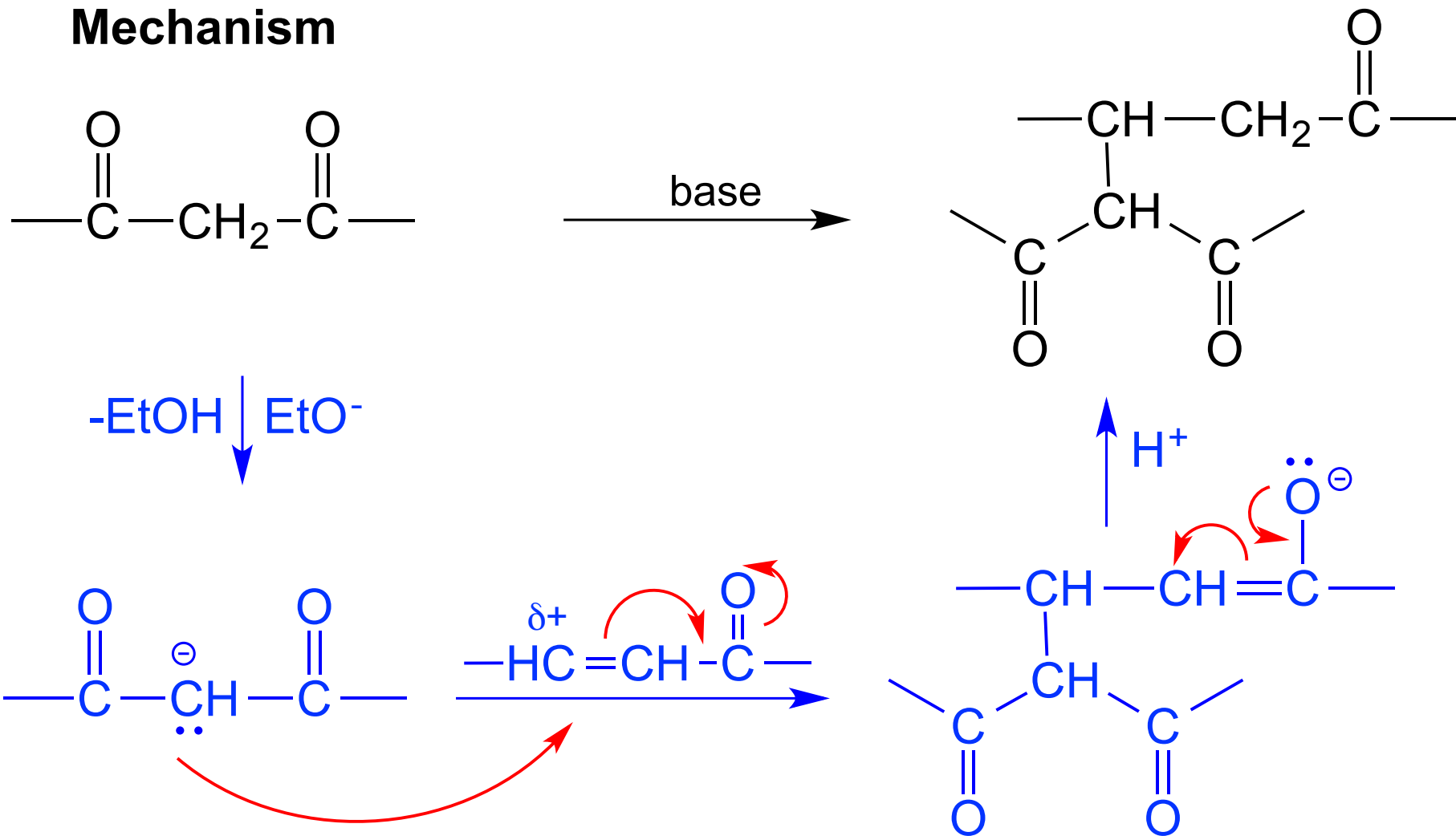
Michael addition (conjugated addition with a C nucleophile)



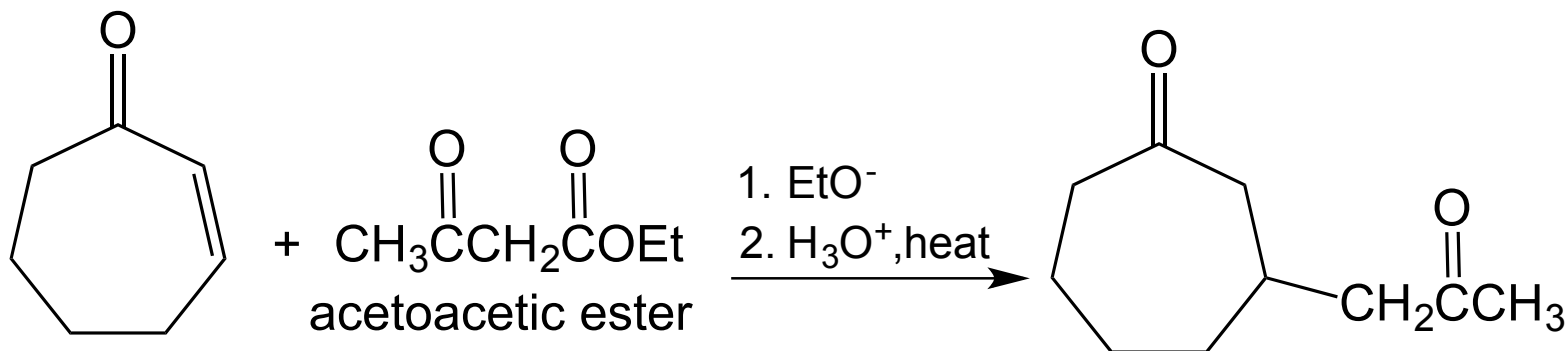
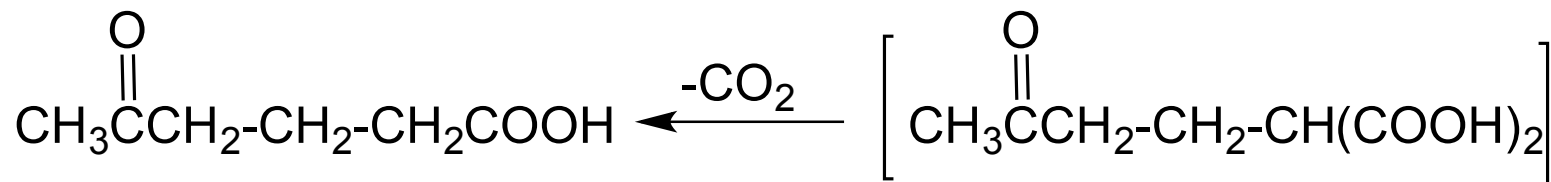
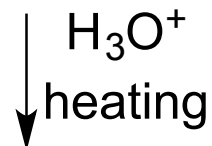
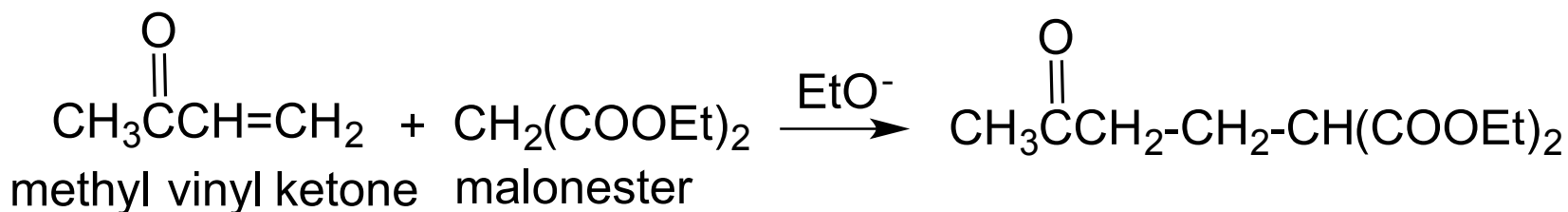
heteroconjugated system



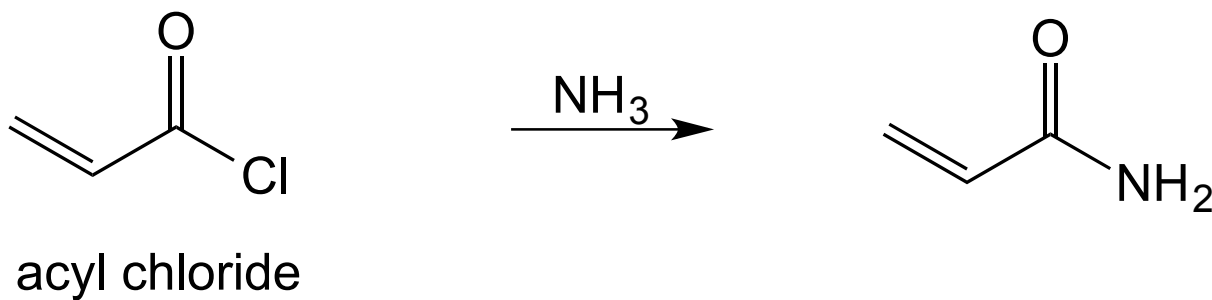
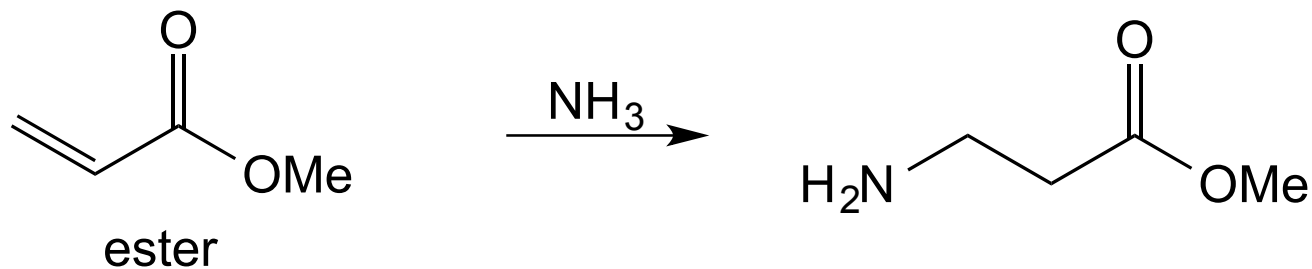
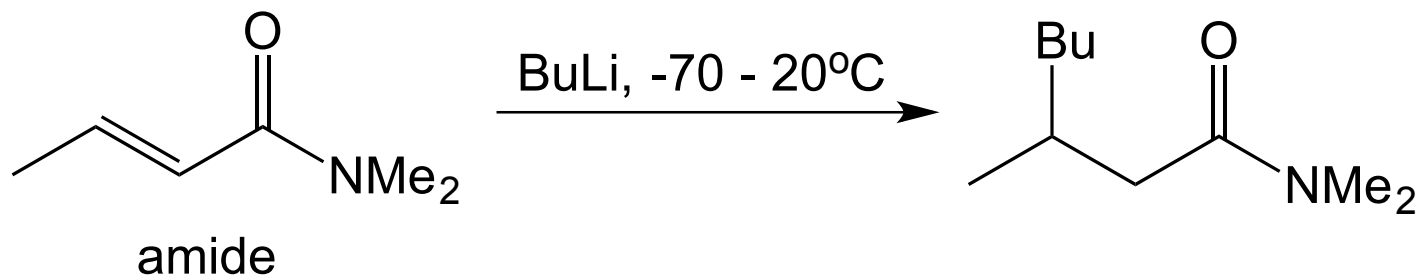
Mechanism



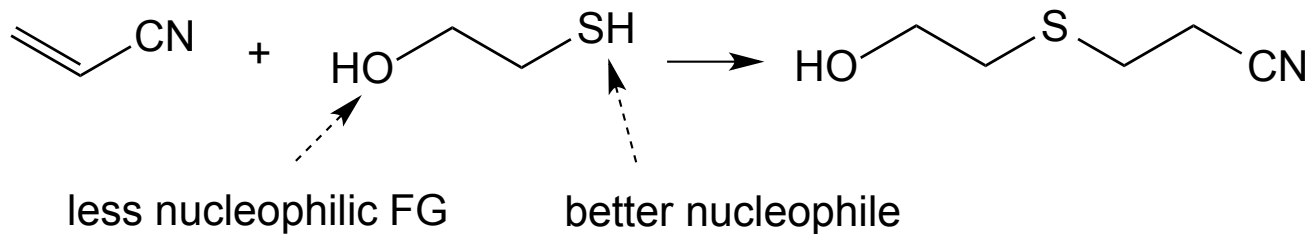
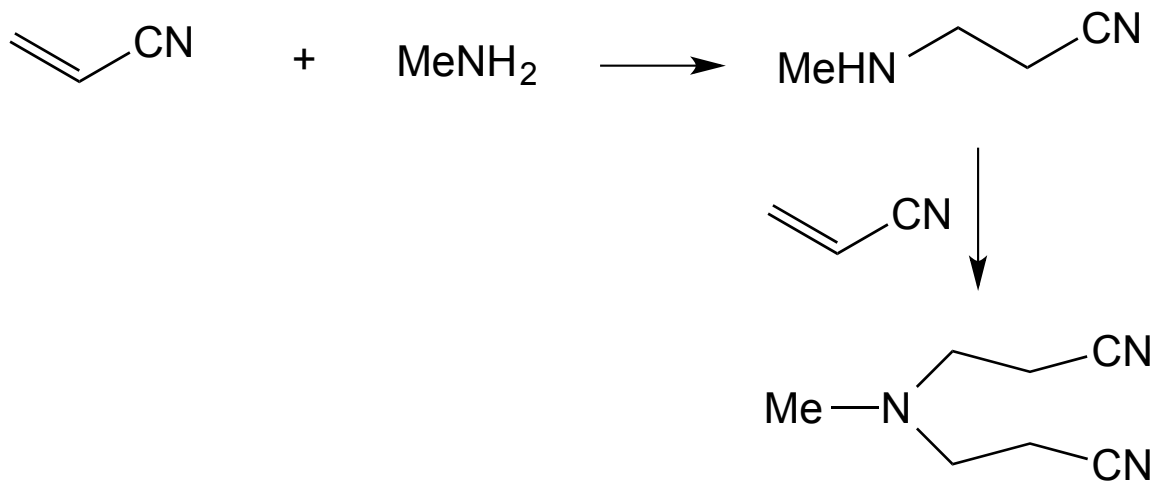
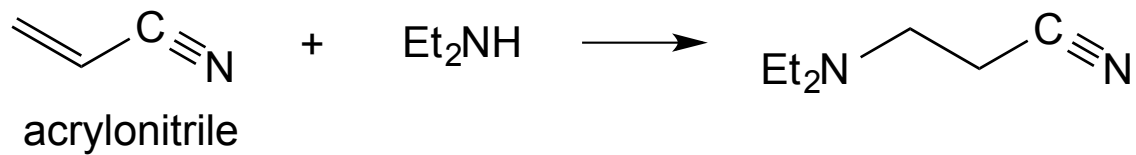
Examples



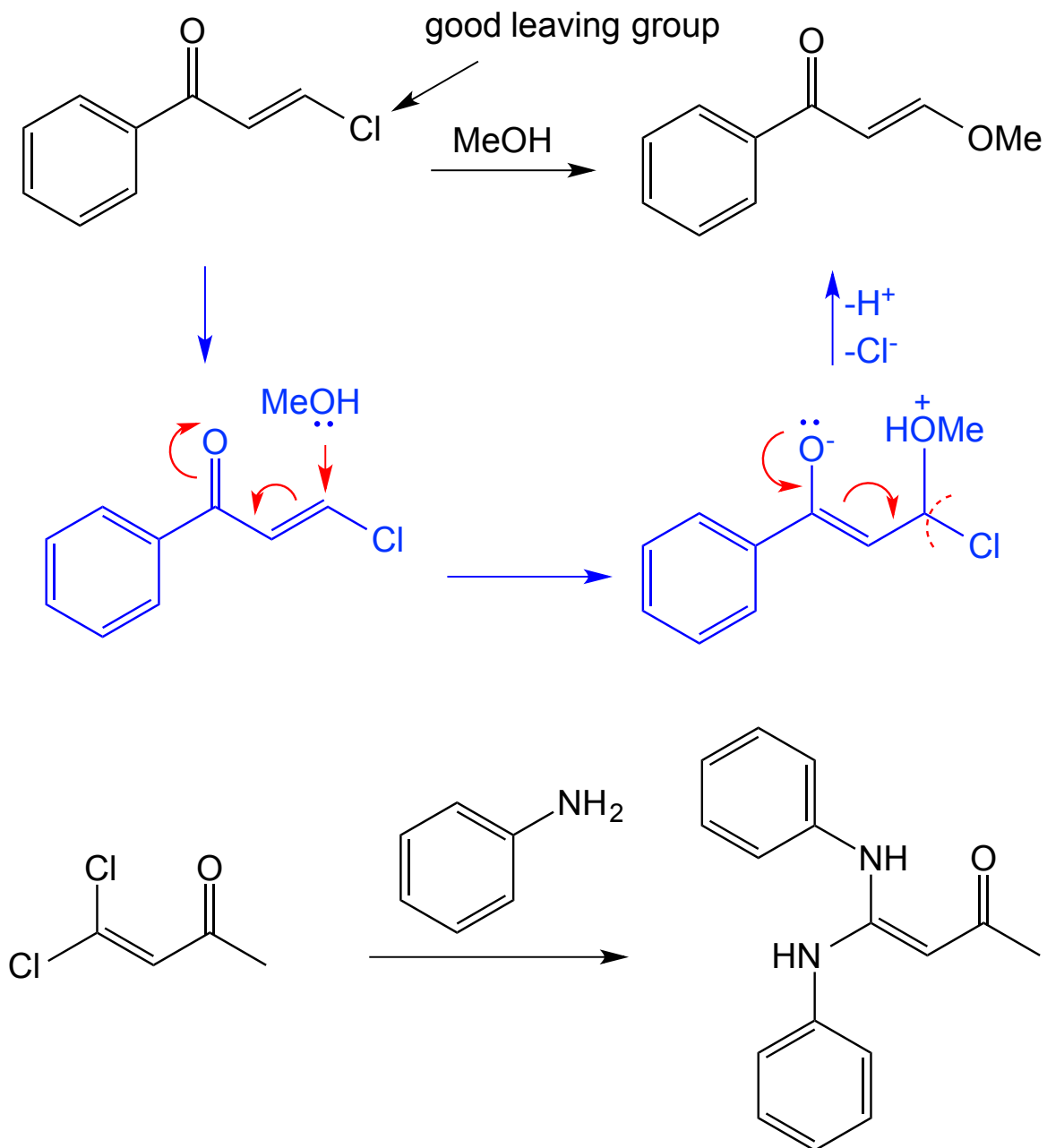
α,β -unsaturated carboxylic acid derivatives



Conjugated addition with nitriles



Conjugated substitution



Arndt-Eistert chain elongation (Wolff rearrangement)

