Chapter 19: Carbonyl Compounds III

Learning Objectives:

1. Write the mechanism for keto-enol tautomerization and explain the consequence of such tautomerizarion in the optical chiral of compound.
2. Remember the approximate p*Ka* value for the α-hydrogen of a carbonyl group.
3. Provide appropriate bases for the formation of enolate and use such enolate for halogenation and alkylation.
4. Be able to write the general electron-pushing (arrow-pushing) mechanisms of Aldol reaction, Michael reaction, Claisen condensation, and Dieckmann condensation.
5. Be able to write the general electron-pushing (arrow-pushing) mechanisms for decarboxylation of 3-oxocarboxylic acids
6. Be able to employ the above-mentioned reaction for the formation of new carbon-carbon bond

Sections to be covered (in the order of delivery):

19.1 Acidity of α-hydrogens*
19.2 Keto-Enol Tautomerism*
19.3 How Enols and Enolate Ions React*
19.4 Halogenation of the α-Carbon of Aldehydes and Ketones*
19.5 Halogenation of the α-Carbon of Carboxylic Acids: The Hell-Volhard-Zelinski (HVE) Reaction
19.6 α-Halogenated Carbonyl Compounds in Synthesis*
19.7 Using LDA to form a Enolate*
19.8 Alkylation of the α-Carbon of Carbonyl Compounds*
19.9 Alkylation and Acylation of the α-Carbon via an Enamine Intermediate
19.10 Alkylation of the β-Carbon: the Michael Reaction*
19.11 The Aldol Reaction*
19.12 Dehydration of Aldol Addition Products: Formation of α,β-Unsaturated Aldehydes and Ketones*
19.13 The Mixed Aldol Reaction
19.14 The Claisen Condensation*
19.15 The Mixed Claisen Condensation
19.16 Intramolecular Condensation and Addition Reactions*
19.17 Decarboxylation of 3-Oxocarboxylic Acids*
19.18 The Malonic Ester Synthesis: Synthesis of Carboxylic Acids
19.19 The Acetoacetic Ester Synthesis: Synthesis of Methyl Ketones
19.20 Designing a Synthesis VI: Making New Carbon-Carbon Bonds

* Sections that will be focused

Recommended additional problems

19.44 – 19.52, 19.54 – 19.64, 19.66 – 19.80