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Other Acyclic Substrates; 3.4 Fluorination, Chlorination, and Bromination Reactions; 3.4.1 Fluorination Reactions; 3.4.2 Chlorination and Bromination Reactions; References

4 Nucleophilic Addition to Electron-deficient C=C Double Bonds4.1 Intermolecular Michael Addition; 4.1.1 Intermolecular Michael Addition of C-nucleophiles; 4.1.1.1 Chiral Bases and Phase-transfer Catalysis; 4.1.1.2 Activation of Michael Acceptors by Iminium Ion Formation, Activation of Carbonyl Donors by Enamine Formation; 4.1.1.3 Addition of C-nucleophiles to Azodicarboxylates; 4.1.1.4 Cyclopropanation of Enoates with Phenacyl Halides; 4.1.2 Intermolecular Michael Addition of N- and O-nucleophiles; 4.1.3 Intermolecular Michael Addition of S- and Se-nucleophiles

4.2 Intramolecular Michael Addition4.2.1 Intramolecular Michael Addition of C-nucleophiles; 4.2.2 Intramolecular Michael Addition of O-nucleophiles; References; 5 Nucleophilic Addition to C=N Double Bonds; 5.1 Hydrocyanation of Imines (Strecker Reaction); 5.1.1 Chiral Diketopiperazines as Catalysts; 5.1.2 Chiral Guanidines as Catalysts; 5.1.3 Chiral Ureas and Thioureas as Catalysts; 5.1.4 Chiral N-Oxides as ""Catalysts""; 5.2 The Mannich Reaction; 5.2.1 Enantioselective Direct Mannich Reaction: Products with One Stereogenic Center

5.2.2 Enantio- and Diastereoselective Direct Mannich Reaction: Products with Two Stereogenic Centers5.2.3 Proline-catalyzed Mannich Reaction: Process Development and Optimization; 5.2.4 Enantioselective Mannich Reaction using Silyl Ketene Acetals; 5.3 - Lactam Synthesis; 5.4 Sulfur Ylide-based Aziridination of Imines; 5.5 Hydrophosphonylation of Imines; References; 6 Nucleophilic Addition to C=O Double Bonds; 6.1 Hydrocyanation; 6.1.1 The Mechanism of the Reaction; 6.2 Aldol Reactions; 6.2.1 Intermolecular Aldol Reactions

6.2.1.1 Intermolecular Aldol Reaction With Formation of One Stereogenic Center

Sommario/riassunto

Asymmetric catalysis represents still one of the major challenges in modern organic chemistry. Besides the well-established asymmetric metal-complex-catalysed syntheses and biocatalysis, the use of ""pure"" organic catalysts turned out to be an additional efficient tool for the synthesis of chiral building blocks. In this handbook, the experienced authors from academia and industry provide the first overview of the important use of such metal-free organic catalysts in organic chemistry. With its comprehensive description of numerous reaction types, e.g., nucleophilic substitution and addition