PRINCIPLES AND APPLICATIONS OF ENOLATE ALKYLATION: A UNIQUE STRATEGY FOR CONSTRUCTION OF C-C (SP3-SP3) BONDS IN ASYMMETRIC FASHION

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PRE-REQUISITES : Basic organic chemistry courses, Basic stereochemistry courses

INTENDED AUDIENCE : UG, PG students. Relevent industrial persons

INDUSTRY SUPPORT : Pharmaceutical Industry

COURSE OUTLINE :

Asymmetric synthesis plays a central role in the field of Organic synthesis. Chirality and biological activity is closely associated hence synthesis of small organic molecule in single enantioemric form is highly desirable. The underlying principles of asymmetric synthesis will help us enormously to design and execute suitable synthetic strategies for optically pure biologically relevant organic molecules. In this course material our main highlight will be to address the reader to become familiar with principles of enolate alkylation for the construction of new C-C bonds and its successful exploration of such strategies enroute to value added enantiopure small organic molecules.

ABOUT INSTRUCTOR :

Prof. Samik Nanda, after finishing PhD in the field of "asymmetric synthesis with the help of enzymes" he was very much interested to carry out an independent research career in the field of asymmetric total synthesis of natural products. Since last fourteen years the research effort of my group was focused on the central theme of "asymmetric synthesis". We have tried to explore many well developed asymmetric synthesis protocols to access our desired target molecules. We have also developed few in-house evolved asymmetric processes which was also successfully employed to access many enantiopure small organic molecules.

COURSE PLAN :

Week 1: Basic introductions to enolates, methods of enolate generation, structure of enolates and characterization, stereoselectivity and regioselectivity in enolate generation, transition state for enolate alkylation, different modes of asymmetric induction in enolate alkylation, intraligand and interligand asymmetric induction (intraanular/extraanular/chelate enforced intraaanular modes)

Week 2: Enolate alkylation of several carbonyl species: Seebach's SRS (self-regeneration of stereocenter) principle and related systems, concepts and applications

Week 3: Enolate alkylation of several carbonyl species: Chiral auxiliaries in C-C bond forming reactions through enolate chemistry (Evans oxazolidinone, Camphor based N-acyloxazolidinones, Oppolzers sultam and related systems)

Week 4: Enolate alkylation of several carbonyl species: Chiral auxiliaries in C-C bond forming reactions through enolate chemistry (Myer's ephidrene, Chiral Weinreb amide and equivalents and related systems)

Week 5: Enolate alkylation of several carbonyl species: Chiral auxiliaries in C-C bond forming reactions through enolate chemistry (Myer's ephidrene, Chiral Weinreb amide and equivalents and related systems)

Week 6: Several methods for alkylkation of amino acids derived substrates (Schollkopf's bis-lactim ether, William's oxazinone, Yamada's chiral glycine enolate and related systems)

Week 7: Aza-enolate alkylation: Ender's RAMP/SAMP, Coltart's cyclic carbamate hydrazone, Ellman's sulfonamide and related systems

Week 8: Organocatalytic methods for enolate alkylation (SOMO activation method), enantioselective alkylation using chiral PTC, enantioselective deprotonation of achiral systems with chiral bases, concluding remarks