

ACHARYA NAGARJUNA UNIVERSITY

DEPARTMENT OF CHEMISTRY

M.Sc. ORGANIC CHEMISTRY :: SEMESTER-IV

PAPER-III (Elective-A): ADVANCED ORGANIC CHEMISTRY (R22OC43A)

(For the students admitted from the A.Y. 2022-2023 onwards)

Max. Marks: 100

(Internal-30M & External-70M)

SYLLABUS

Learning Objectives:

- ✓ To introduce novel named reactions in modern organic synthesis.
- ✓ To know importance and principles of green chemistry, and microwave assisted reactions.
- ✓ To know the role of Nanochemistry in various fields and synthesis methods (Solid and Gase phase).
- ✓ To introduce green chemistry and microwave assisted reactions.
- ✓ To know use of organoboranes and organosilanes in synthesis.
- ✓ To introduce supramolecular chemistry and to know the mechanism of building blocks.

UNIT-I:

12H

Advanced named Reactions in Organic Synthesis:

Baylis-Hillmon reaction, RCM Olefin metathesis, Grubb's catalyst, Mitsunobu reaction, Suzuki Coupling, Heck Coupling, Stille Coupling, Sonagashia, Coupling, Negishi Coupling, Hiyama Coupling, Buchwold – Hartwig Reaction, Click Reaction.

UNIT-II:

10H

Nano Chemistry

Introduction, Carbon Nanotubes: Structure of single and multi wall carbon nanotubes, synthesis-solid and gaseous carbon source-based production techniques, synthesis with controlled orientation. Growth mechanism of carbon nanotubes-catalyst free growth, catalyst activated growth, nano buds, nanotorus properties-general, adsorption, electronic & optical, Mechanical and reactivity. Defects, Toxicity Applications.

UNIT-III

12H

Green Synthesis:

Introduction, Principles, Green solvents- supercritical fluids, water, ionic liquids and PEGs as green solvents for organic reactions. Examples of green reactions-synthesis of Ibuprofen, Clean Fischer-Indole synthesis comparison of the above with conventional methods.

Microwave Organic Synthesis: Introduction, Applications: Microwave-assisted reactions in water (oxidation of toluene to benzoic acid, oxidation of alcohols); organic solvents (Diels-Alder reaction and Decarboxylation); solvent-free reactions (solid state reaction)-Michael addition and Knoevenagel reaction), multistep V/s single pot synthesis.

UNIT-IV:

12H

Organoboranes and Silanes:

Organoboranes: Synthetic applications of organoboranes-protonolysis, oxidation, carbonylation Reaction of alkenyl borane-enantioselective synthesis of secondary alcohols from alkenes.

Organosilanes: Synthesis of organosilanes, general features of carbon-carbon bond forming reactions of organosilicon compounds, addition reactions with aldehydes and ketones, acylation reactions, conjugate addition reactions.

UNIT-V:

12H

Supramolecular Chemistry: Introduction-the meaning of supramolecular chemistry, phenomenon of molecular recognition and their quantification Building blocks of supramolecular chemistry-acyclic receptors for neutral and charged guests, macrocycles and crown ethers, macrobicycles and cryptands, macropolycycles, cucurbituril and cyclodextrins.

Reference Books:

- 1) New trends in green Chemistry by V.K.Ahluwalia
- 2) Organic synthesis by Robert & Ireland (Printce Hall of India)
- 3) Designing Organic Synthesis B staurt Warron, John Wiley & Sons
- 4) Green chemistry, **V.K.Ahluwalia**, Ane books.
- 5) P.T. Anastas and J.C.Warner **Green chemistry**, Oxford.
- 6) G.A.Ozin, A.C. Arsenault **Nano chemistry**, RSC.
- 7) Diwan, Bharadwaj, **Nanocomposites**, Pentagon.
- 8) V.S.Muralidharan A.Subramania, **Nanoscience and Technology**, Ane Books.
- 9) J.W Steed and J.L Atwood, Supramolecular chemistry, John Wiley & Sons, Ltd. New York.
- 10) Piet W. N. M. van Leeuwen, Supramolecular Catalysis, Wiley-VCH Verlag GmbH & Co.
- 11) Principles and methods in supramolecular chemistry, Hans - Jorg Schneider and A.Yatsimirsky, John Wiley and Sons.
- 12) Analytical Chemistry of Macrocyclic and Supramolecular Compounds, S.M.Khopkar, Narosa Publishing House.

Learning Outcomes:

- ✓ Students able to understand novel named reactions and applications in modern organic synthesis.
- ✓ Students understand the importance and principles of green chemistry, microwave assisted reactions and know applying the green synthesis to organic reactions.
- ✓ Students know current importance of Nanochemistry in various fields and their synthetic methods (Solid and Gase phase).
- ✓ It provides the knowledge of using organoboranes and organosilanes in synthesis.
- ✓ Students understand requirements of guest and host and formation of building blocks of supramolecular chemistry.



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