

OC H 553: Natural Products Chemistry

COURSE OUTCOME:

- Students will get a good understanding of isolation, classification natural products,
- To learn methods of structure elucidation and synthesis of various types of alkaloids, terpenoids, carotenoids,
- Steroids and steroidal hormones with representative examples, transformations in steroids and hormones and
- To study steroidal oral contraceptives.

UNIT-I: [15 Hours]

Alkaloids: Definition, Classification and isolation of alkaloids, general methods of structural determination of alkaloids, detailed study of structure elucidation, stereochemistry, rearrangement, Synthesis and biogenesis of Papaverine, Adrenaline, Ephedrine, Piperine, Cinchonine, Quinine, Morphine, Yohimbine, Reserpine and Lysergic acid.

UNIT- II: [15 Hours]

Terpenoids: Introduction, classification, isoprene rules, methods of structure determination. Structural elucidation & synthesis of Geraniol, Menthol, α -Pinene, Camphor, Farnesol, Zingiberene and α -Santonin, Vetivones, Caryophyllene. **Diterpenoids:** Abietic and Gibberillic acid.

Triterpenoids: Squalene and Phytol.

Carotenoids: Introduction and geometrical isomerization of Carotenes. Structure and Synthesis of β -Carotene and Lycopene.

UNIT- III: [15 Hours]

Steroids: Introduction and Nomenclature of steroids, Blanc's rule, Barbier-Wieland degradation, Oppenauer oxidation, Diel's hydrocarbon, Chemistry of Cholesterol, Ergosterol, Vitamin-D, Stigmasterol & bile acids.

Steroidal hormones: Chemistry of Oestrone, estradiol, estrone and their chemical relationship. Progesterone, androsterone and testosterone - Structure and Synthesis of Cortisone, Cortisol and Aldosterone. Transformations in steroids and hormones. Steroidal oral contraceptives.

References:

1. Natural Products Chemistry Vol-I & II. G. R. Chatwal (Himalaya) 1990.
2. Chemistry of Natural Products – Vol-I & II – O. P. Agarwal (Goel) 1985.
3. Organic Chemistry, Vol-I & II- I. L. Finar (Longman ELBS London), 2000.
4. Chemistry of Natural Products: A Unified Approach-N R Krishnaswamy (University Press) 1999.
5. Chemistry of Natural Products-[Sujata V. Bhat](#), [B.A. Nagasampagi](#), [Meenakshi Sivakumar](#) (Springer-Narosa) 2005.

OC S 554: Synthetic Polymers, Dyes and Pesticides

COURSE OUTCOME:

Enable the students:

- To acquire detailed knowledge in classification and nomenclature of polymers, methods of polymerization, mechanism and stereochemistry, properties, structure,

synthesis and applications of synthetic polymers, polyesters, polyamides, phenol-formaldehyde, urea-formaldehyde and epoxy resins, polyurethanes, polycarbonates, synthetic rubber, manufacture and structural features of natural rubber and regenerated cellulose.

- To understand the modern theories of colour and constitution, classification of dyes, methods of applying dyes to the fabrics, Synthesis and applications of various types of azo dyes, triphenyl methane dyes, cyanin dyes, reactive dyes, optical brighteners and pigments.
- To gain knowledge about classification, mode of action and synthesis of several organophosphorous and organochlorine insecticides, natural pyrethroid insecticides, isolation and structure of natural pyrethrins, synthetic pyrethroids,
- To study the Synthesis and uses of insect pheromones in pest control, fungicides and herbicides, fumigants and repellants, mechanism of action and toxicities of insecticides, fungicides and herbicides.

UNIT-I:

[12 Hours]

Synthetic polymers: Classification and Nomenclature. Methods of polymerization, Mechanism and Stereochemistry, Addition polymerization (Anionic, Cationic and Free radical process), Condensation and Stepwise polymerization, Coordination polymerization, Ring opening polymerization. Mechanism of co polymerization. Properties, Structure and applications of Polythene, Polypropylene, PVC, Polystyrene & Acrylic polymers, Teflon, polyesters, polyamides, Phenol-Formaldehyde resins, Urea-Formaldehyde resins, Epoxy resins, Polyurethanes, Polycarbonates, Synthetic rubber. Structural features and manufacture of natural rubber and Regenerated cellulose. Ziegler-Natta catalyst.

UNIT -II :

[12 Hours]

Dyes: Introduction, modern theories of colour and chemical constitution. Classification of dyes, methods of applying dyes to the fabrics. A general study of Azo dyes- Orange –II, rosanthrene O, Naphthol blue black 6B, Mordant brown, Congo red, Methyl orange, Chrysoidin G, Bismark brown.

Triphenylmethane dyes- Malachite green, Rosaniline, Crystal violet and Phenolphthalein;

Cyanin dyes- Ethyl Red, Cyanin blue and Quinaldine, Reactive dyes and Optical brighteners-Tinopal and Blankophor.

Pigments: Fast violet, Lake red and Orange R.

UNIT - III :

[12 Hours]

Insecticides: Introduction, classification, mode of action and synthesis of Methoxychlor, chlordane, heptachlor, Hexachlorocyclohexane, Parathion, Diazenon, Sevin and Beygon. Naturally occurring insecticides-pyrethroids-natural pyrethrins-isolation and structures, synthetic pyrethroids.

Insect Pheromones: Introduction, Classification and use in insect pest control. Synthesis of disparlure, grandisol, Periplanone-A & B and bomykol. **Fungicides:** Introduction, Systemic fungicides-types & examples.

Herbicides: Introduction, study of sulfonyl ureas and heterocyclic sulphonamides. Fumigants and repellants. Mechanism of action and toxicities of insecticides, fungicides and herbicides.

References:

1. Polymer Science- V.R.Gowariker, N.V.Vishwanathan & T.Shridhar (Wiley Eastern) 2008.
2. Textbook of Polymer Science, 3rd Edition, [Fred W. Billmeyer](#) (Wiley) 1984.
3. A Textbook of Synthetic Dyes- [O.D. Tyagi](#) & [M. Yadav](#) (Anmol Publications) 2002.