

Course Number: CY 501P

Course Name: Organic Chemistry Laboratory

Credits: 4-0-0-4

Prerequisites: Core course

Intended for: M.Sc in Chemistry

Distribution: Core course

Semester: Even

Preamble: This course tries to demonstrate to the students more practical and complex synthetic chemistry. The idea is to make students more skilful in terms of handling organic reagents and make them efficient in performing all types of organic reactions.

Course Outline: The course includes all ranges of experiment from extraction of natural products, quantitative estimations, organic synthesis, generating organic reagents and use of instrumental techniques for structural elucidation of organic compounds.

Course Modules:

(1) Techniques:-

- (a) An introduction to Chromatography: an efficient technique for purification of organic compounds.
- (b) Practical demonstration of TLC (thin layer chromatography).
- (c) Practical demonstration of column chromatography. (3 hr)

(2) Learning structure elucidation of organic molecules & determination of following functional groups using IR and NMR spectroscopy:-

- (a) Amines
- (b) Imines
- (c) Esters
- (d) Amides
- (e) Carboxylic acid
- (f) Alcohol
- (g) Ethers
- (h) Aldehydes/Ketones (3 hr)

(3) Extraction of Organic compounds & their characterization using IR, NMR and Mass spectroscopy:-

- (a) Extraction of **caffeine** from tea leaves.
- (i) Extraction of **piperene** from black pepper powder. (6 hr)

(4) Quantitative Estimations:-

Estimation of carbonyl group:-

- (i) Standardization of glucose solution by Fehling's Method.
- (j) Determination of percentage purity of given sample of glucose. (3 hr)

(5) **Organic Synthesis-: Synthesis of organic molecules & their characterization using IR, NMR and Mass spectroscopy.**

(a) One step synthesis-:

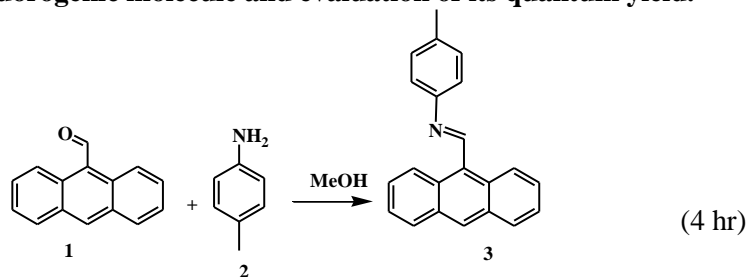
Synthesis of Bezpinacol

(b) Multistep Synthesis-:

Synthesis of Benzilic Acid



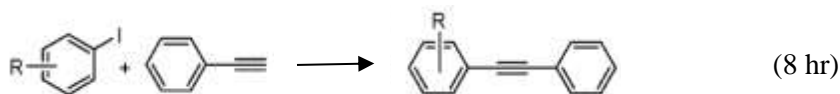
(6) **Synthesis of a fluorogenic molecule and evaluation of its quantum yield.**



(7) (a) **Introduction to c-c couplings.**

(b) Significance of c-c couplings in pharmaceutical industry.

(c) Performing Sonogashira coupling at laboratory scale.



(8) **Synthesis of organic reagent, use of reagent in organic reaction & determination of its optical activity.**

(a) Synthesis of N-Bromosuccinamide (organic reagent, involves highly toxic and fuming Br_2 for synthesis).

(b) Use of NBS in synthesis of halohydrin (Electrophilic Addition Reaction).

(c) Determination of optical activity of generated product using polarimeter. (7 hr)

(9) Use of Computer - Chem Draw, Draw the structure of simple aliphatic, aromatic, heterocyclic compounds with different substituents. Get the correct IUPAC name and predict the ^1H NMR signals.

(1 hr)

(10) **Practical demonstration of instruments**

(a) HPLC

(b) NMR

(1 hr)

NOTE- Alternate practical may be offered subject to conditions and availability of chemicals.

Books Recommended

- 1) Vogel's textbook of practical organic chemistry, *Publishers: John Wiley and Sons.*
- 2) Vogel's elementary quantitative organic analysis, *Publishers: John Wiley and Sons.*
- 3) An Introduction to Modern Experimental Organic Chemistry, by Robert, Gilbert & Rodewald, *Publishers: Saunders's Publication.*
- 4) Fundamentals of Analytical Chemistry by Skoog, West and Holler, *Publishers: Saunders's College publishing.*
- 5) Organic structures from Spectra by Field, Sternhell & Kalman, *Publishers: John Wiley and Sons.*