

PHC 251 : PHARMACEUTICAL ORGANIC CHEMISTRY (3 + 1)

Prereq.: Chem. 105 + 106 or 108

Course Description

The course deals with the nature and mechanisms of the chemical reactions, the physical and chemical properties of the different functional groups, stereochemistry and the chemistry of heterocyclic compounds.

	<u>No. of Lectures</u>
A. Classes and mechanisms of organic reactions	
i. Substitution reactions	2
a) Nucleophilic substitution (SN^1 , SN^2 , free-radical).	
b) Electrophilic substitution.	
ii. Elimination reactions (E1, E2)	2
iii. Addition reactions (ionic and free-radical additions).	2
iv. Rearrangement reactions (rearrangement at electron-deficient carbon, oxygen and nitrogen).	2
B. Chemistry of the functional groups	
i. Halogenated compounds.	2
ii. Oxygen-containing compounds.	4
iii. Nitrogen-containing compounds.	3
C. Stereochemistry	
i. Conformational isomerism.	1
ii. Geometrical stereoisomerism.	2
iii. Optical stereoisomerism.	
a) Optical activity, enantiomers, diastereomers and meso compounds.	3
b) Resolution.	1
c) Synthesis of optically active stereoisomers.	1
d) Reactions involving stereoisomers and their importance in drug-receptor interactions.	1

	<u>No. of Lectures</u>
D. Medicinally important heterocycles	
i. Introduction and nomenclature	2
ii. Five-membered heterocycles	5
a) Pyrrole	
b) furan	
c) thiophene.	
iii. Six-membered heterocycles (pyridine)	5
iv. Miscellaneous fused ring heterocycles	2
a) Purines,	
b) Quinazolines,	
c) Phenothiazines	
d) Benzodiazepines.	
E. Two Examinations	2

	Total 42

PHC 251: PRACTICAL

This laboratory deals with the identification of organic compound through their physicochemical properties and their functional group characteristics.

Lab. No.

1 **Physical properties of organic compounds.**

- i. Condition:
- ii. Colour
- iii. Odour
- iv. Solubility:
 - a) in cold water
 - b) NaOH & Na₂CO₃.
 - c) dil. HCl
 - d) Na₂CO₃
- v. Ignition test.

2 **Classification by general chemical tests**

- a) Neutral ferric chloride solution.
- b) Heat sample.
- c) Aldehydes and ketones.
- d) Esters
- e) Amines
- f) Phenols

3 **Infrared spectroscopy**

Introduction to the techniques.
Interpretation of spectra.

4,5 **Functional group classification and characterization:**

- I. Alcohols:
 - a) Physical properties
 - b) Classification:
 - i) IR spectra
 - ii) Chemical test:
3,5-dinitrobenzoyl chloride
 - c) Full identification:
 - i. Ethanol
 - ii. Benzyl alc.
 - d) Special test: Methanol + Glycerol.
- II. Phenols:
 - a) Physical properties.

- b) Classification:
 - i) IR spectra.
 - ii) Chemical test:
 - 1. 3,5-dinitrobenzoyl chloride.
 - 2. FeCl₃ test
(to differentiate between alcohol & phenols).
- c) Identification:
 - 1. Phenol.
 - 2. m-Cresol.
- d) Special tests:

Resocinol, Catechol, Hydroquinone (Phthalein test),
(FeCl₃), (FeCl₃)

6 & 7 III. Aldehydes & Ketones:

- a) Physical properties.
- b) Classification.
 - i) IR spectra.
 - ii) Chemical tests:
 - 1. 2,4-Dinitrophenyl hydrazine.
 - 2. Tollen's test.
[to differentiate between ald.& ketones]
- c) Identification:

Aldehydes: Acetaldehyde - benzaldehyde
Ketones : Acetone - Acetophenone.
- d) Special tests: Formaldehyde.

8 Unknown (Revision)

9 **Practical examination No. 1**

10 **IV. Carboxylic acids.**

- a) Aliphatic carboxylic acids.
 - i. General reactions.
 - ii. Special tests.

Lab. No.

b) Aromatic carboxylic acids.

- i. General reactions.
- ii. Special tests.
- iii. Distinction from phenols.

11 **V. Esters of carboxylic acids.**

- a) Esters
- b) Amides and imides.

12 **VI. Amines**

- i) General reactions.
- ii) Differentiation between 1°, 2°, 3° amines.

13 **Revision.**

14 **Practical examination No. 2.**

14 Total
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