

SEMESTER I
CM1401 CHEMISTRY FOR LIFE SCIENCES

Prerequisite: GCE 'A' level or H2 Chemistry or equivalent or CM1417

Workload: 40 lecture hours + 10 tutorial hours

This is a chemistry module catered for Life Science students and deals primarily with the basic principles to understand the structure and reactivity of organic molecules, basic thermodynamics and kinetics, and some basic analytical techniques. Students should acquire fundamental knowledge in chemistry for applications to biological systems.

Lecture	Topic	Topic Description
1-2	Structure	Atomic structure: wave-particle duality of matter and energy, electron configuration and chemical periodicity, exclusion principle, periodic table and its trends
3-4	Structure	Models of chemical bonding: Lewis electron dot symbols, shapes of molecules, theories of covalent bonding - valence bond theory, hybrid orbitals, molecular orbital theory, electron delocalization.
5-6	Thermodynamics	Laws of Thermodynamics, Gibbs energy.
7-8	Thermodynamics	Chemical and acid-base equilibria
9	Electrochemistry	Redox reactions, Nernst, ions in solutions
10	Kinetics	Rates of reactions, temperature dependences, differential/integration methods in kinetics, collision theory, mechanisms
11-12	Analytical	Spectroscopic techniques : UV, IR, NMR, mass spectrometry
13-14	Alkanes	Nomenclature, properties, conformation, cycloalkanes, conformations of cyclohexane
15	Alkenes and Alkynes	Nomenclature, electronic structure, addition reactions, carbocation structure and stability, oxidation of alkenes, preparation of alkenes, alkyne acidity
16	Aromatic compounds	Structure and stability of benzene, electrophilic aromatic substitution, substituent effect in electrophilic aromatic substitution, reduction of aromatic compounds
17-18	Stereochemistry	Chirality, optical activity, specific rotation, enantiomers, diastereomers, meso compounds, molecules with more than 2 stereocentres, racemic mixture and the resolution of enantiomers
19	Alkyl halides	Nomenclature, preparation of alkyl halides, Grignard reagents, S _N 1 and S _N 2 reactions, E1 and E2 reactions
20	Alcohols, ethers and phenols	Nomenclature, properties, synthesis and reactions of alcohols, phenols and ethers, epoxides, ring-opening reactions of epoxides
21	Carbonyl compounds	Nomenclature, structure and properties, synthesis of aldehydes and ketones, oxidation, nucleophilic addition reactions
22-23	Carboxylic acids and its derivatives	Nomenclature, acidity of carboxylic acids, synthesis and reactions of carboxylic acids and their derivatives
24	Amines	Nomenclature, structure and properties, amine basicity, synthesis and reaction of amines

RECOMMENDED TEXTBOOK:

"Chemical Principles" by Steven S. Zumdahl and Donald J. DeCoste

"Organic Chemistry with Biological Applications" by John McMurry

MODE OF ASSESSMENT: Two Tests and One Final Exam

LECTURER:

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