



Department ofBiology.....

College ofScience.....

University ofSalahaddin.....

Subject:Chemistry.....

Course Book – (First Year)

Lecturer's name:

**SawarIbraheemMaulood.MSc,Ala jalal
ahmad.MSc, Nishtiman Saeed Hasan.MSc.**

Academic Year 2022/2023

Course Book

1. Course name	Chemistry
2. Lecturer in charge	Sawar Ibraheem Maulood, Ala jalal ahmad, Nishtiman Saeed Hasan.
3. Department/ College	Biology/ Science
4. Contact	e-mail:sawar.maulood@su.edu.krd ala.ahmad@su.edu.krd nishtiman.hasan@su.edu.krd Tel: (optional)
5. Time (in hours) per week	For example Theory: 2 Practical: 6
6. Office hours	
7. Course code	107
8. Teacher's academic profile	I graduate from Salahaddin university in 1990 in chemistry department (Ranked first). I finished my master degree in natural chemistry in 1996, and start as assistant lecturer teaching theory and practical general chemistry in Biology department till now and, Im now is teaching as assistant pro. In (1998-2001), I teach practical Biochemistry for post graduated students (MSc, PhD). In (2001-2002) I teaches pratical Biochemistry for second class in the college of agriculture. In(2002-2003) I teaches teaching Molecular Biology for the forth class students in the Biology department
9. Keywords	Isomer, hybridization, Lipid, hydrogenation, steroids.

10. Course overview:

Science of Chemistry is central to the discovery, understanding and development of many important breakthroughs in biology, medicine, and materials science. This course will provide an introduction of the concepts and fundamental reactions of Organic Chemistry, show how these discoveries are supported experimentally, and how this knowledge can be used in a problem-solving and predictive capacity.

Also The course is designed to introduce and develop the fundamental data and concepts of organic chemistry and analytical chemistry; to show some of the key experimental evidence which supports these concepts; to apply these data and concepts to chemical problem solving; and to demonstrate that the subject is still evolving and that it has a key role to play in modern technological developments in diverse fields, ranging from biology to materials science

11. Course objective:

12. Student's obligation

All students should take 2 exams during the year, all cell phones are to be turned off and no talking during the lecture.

13. Forms of teaching

Power point presentation for the head titles, definitions, practical preparations of the compounds, and the procedure of identification, purification and standardization of the compounds with determination the concentration of the unknown will be used to reach the objective.

Furthermore students will be asked for prepare a report and seminar about all experiments.

14. Assessment scheme

Theory/the students will be required to do two closed book exams; the mean of the two exams has 50 marks beside other assignments including dairy exam (10 marks). So that the final grade of theory exam has 60 marks.

Practical/ The students will be required to do two closed book exams; the mean of the two exams has 30 marks beside other assignments including dairy exam (5 marks), reports (5 marks) and seminars.. So that the final grade of practical exam has 40 marks.

15. Student learning outcome:

In the end of the course you should know:

- 1- Methods of expressing solution concentration.
- 2- Preparation of solutions (liquid and solid) to some high degree of precision.
- 3- Identification and quantification of the components of material system.
- 4- Methods of purification of liquid and solid compounds.
- 5- Determination of boiling point ,melting point and freezing points

16. Course Reading List and References:

Organic chemistry with a biological emphasis. volume 1 By: Timsoderberg.

"Organic Chemistry", Second Edition, Maitland Jones, Norton, 2000

"Foundations of Organic Chemistry", Hornby and Peach, OUP, 1994

"Organic Chemistry", Clayden, Greeves, Warren and Wothers, OUP, 2000

"Principles of Organic Synthesis", Third Edition, Norman and Coxon, Blackie, 1995

"Foundations of Chemical Biology", Dobson, Gerrard, Pratt, OUP, 1998

"Biochemistry," Voet and Voet, Wiley, 2002

Fundamental of analytical chemistry ,9th edition ,By: Skoog.

17. The Topics:

Lecturer's name

<p>Course Content: The course will provide a comprehensive introduction to the fundamentals of organic chemistry, and no previous knowledge of Organic Chemistry will be assumed. The Introductory Course of MT will deal mainly with general concepts, which will be built upon in later lectures. Topics to be covered are:</p> <p>Lecture 1: What do we mean by Organic Chemistry? a broad overview of the First Year course. Books, models, and study methods. Carbon element, its electronic properties, valance, and hybridization.</p> <p>Lecture 2 Bonding. The Structure of methane, and higher alkanes to C₆. Branching and rings. Alternative representations of organic structures introduced with alkanes. Rotation about simple single bonds, concept of conformation, their general physical properties and un reactivity under many circumstances. Electro negativity and bond polarization – carbon halogen bonds.</p> <p>Lecture 3: -Bonding. Structure of alkenes, nomenclature and brief general remarks about scope for reactivity - concept of localized functionality. Stereo isomerism of alkenes –conjugation – concept of resonance and its pitfalls; curly arrows to relate canonical structures - introduced by consideration of butadiene and benzene.</p> <p>Lecture 5: Structure and reactions of esters. Mechanisms of hydrolysis; tetrahedral intermediates in the formation and hydrolysis of carboxylic acid esters; reduction of esters with LiAlH₄ and reaction of esters with Grignard reagents; amides: hydrolysis under acidic and basic conditions; reduction of amides with LiAlH₄. synthesis of amines.</p> <p>Lecture 6: Carbonyl compounds. Halogenations; differences under acidic and basic conditions</p> <p>Lecture 7: Reactions of carbonyl groups. Enolisation followed by attack at a carbonyl group. Aldol condensation and its reversal, simple and crossed aldol reactions; ester condensations both acyclic and cyclic, crossed condensations.</p> <p>Lecture 8: Alkenes from carbonyl compounds. The Wittigs reaction of phosphorous ylids with aldehyde and ketone carbonyl groups to make alkenes.</p> <p>Lecture 9: Alkenes. Preparations: (i) HOBr (anti attack);(ii) per cyclic</p>	
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<p>additions (hydroboration (then H_2O_2, NaOH), O_3 (and then Me_2S); (iii) free radical additions (anti Markownikov); (iv) catalytic hydrogenation.</p> <p>Lecture 10: Alkynes. Preparations: (i) alkylation of terminal alkynes (acidity); (ii) elimination of dihalides. Reactions (i) alkylation; (ii) isomerisation; (iii) reduction (to cis/trans alkenes).</p> <p>Lecture 11: Alcohols. Preparations: from organohalides, alkenes, reduction of $\text{C}=\text{O}$ compounds, Grignard reactions Reactions: organohalide formation, ester formation, oxidation, Williamson ether synthesis (choice of alcohol and halide), Ethers.</p> <p>Lecture 12: Amines. Preparations: alkylation direct/indirect (Gabriel), reduction of amides, nitriles, reductive amination Reactions: amide formation.</p> <p>Lecture 13: Lipids, types of lipids, Fatty acids, cis and trans isomers of fatty acids, Steroids, cholesterol, bile salts, and steroid hormones.</p> <p>Lecture 14: Steroids, cholesterol, bile salts, and steroid hormones, Carbohydrates'.</p> <p>Recommended texts: Lecture 15: First semester examination would be out of 40 %.</p> <p>Second semester</p> <p>Lecture 16: Analytical chemistry, application of analytical chemistry, standard solution, preparation of standard solution.</p> <p>Lecture 17: primary standard solution, the requirements of titration, end point, standardization.</p> <p>Lecture 18: Acid and bases, and neutralization reactions.</p> <p>Lecture 19: Concentrations of reactants in solution (molarity, normality, percent composition).</p> <p>Lecture 20:: Acid- base reactions, diluting concentrated solutions.</p>	
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<p>Lecture 21: oxidation reduction reactions, red-ox titration, identify red-ox titrations, some application of red-ox reactions.</p> <p>Lecture 22: precipitation reaction and solubility rules, Acid- base reactions.</p> <p>Lecture 23: second semester examination would be out of 40 %.</p>	
<p>18. Practical Topics (If there is any)</p>	
<p>Week 1: General provisions about apparatuses, working in laboratory, and chemical compounds.</p> <p>Week 2: Calculation formulas: Molarities, Normality and part per million, Preparation of solid and liquid solutions</p> <p>Week 3: Introduction to titrimetric analysis, terminology, and standardization.</p> <p>Week 4: Application of titrimetric Analysis, Acid-Base titration and titration curves, titration of Sodium carbonate.</p> <p>Week 5: Precipitation reaction. Reaction of silver nitrate with Sodium Chloride.</p> <p>Week 6: Applications of Oxidation-Reduction reaction, reaction of Potassium permanganate with Sodium oxalate.</p> <p>Week 7: Complex ion formation reaction:</p> <p>The Introduction, the complex ion terminology, the reaction of EDTA with metal ions.</p> <p>Week 8: EDTA with water hardness, and water hardness calculation.</p> <p>Week 9: Seminar</p> <p>First semester examination would be out of 10 %.</p> <p>In the second semester eight experiments will be done in the same day by all the students, each student will do one experiment and these are the name of the experiments:</p> <ol style="list-style-type: none"> 1- Re-crystallization. 2- Simple distillation. 3- Fractional distillation. 4- Freezing point. 5- Extraction of caffeine from tea. 6- Boiling point. 7- Sublimation. 	

<p>8- Melting point. 9- Seminar</p> <p>Second semester examination would be out of 10%.</p>	
<p>19. Examinations:</p> <p>1) Write a short report about precipitation reaction.</p> <p>2) Write the types of hardness, the methods of releasing them.</p> <p>1- Describe the followings:</p> <p style="padding-left: 40px;">Purification melting point</p> <p>2- A/ Write two methods for purification of solid materials.</p> <p style="padding-left: 40px;">B/ why does diet soda freeze at a higher temperature than regular soda?</p> <p>3- In order to find the molar mass of an unknown compound, a research scientist prepared a solution of 0.930 g of unknown in 125 g of a solvent. The pure solvent had a freezing point of 74.2 °C, and the solution had a freezing point of 73.4 °C. Given the solvent's freezing-point depression constant, $K_f = 5.50 \text{ °C/m}$, find the molar mass of the unknown.</p>	
<p>20. Extra notes:</p>	
<p>21. Peer review</p>	