

Ministry of Higher Education and Scientific research



**Department of Chemistry**

**College of Science**

**University of Salahaddin**

**Subject: Organic Chemistry**

**Course Book – (Year 3)**

**Lecturer's name: Dr.Sirwan T.Othman**

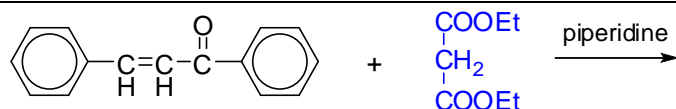
**Academic Year: 2022/2023**

# Course Book

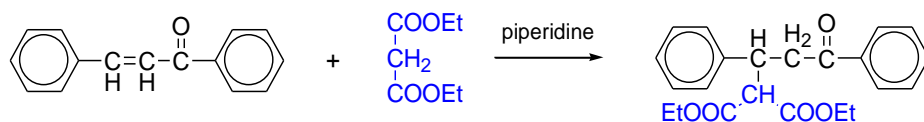
<b>1. Course name</b>	<b>Organic Chemistry</b>
<b>2. Lecturer in charge</b>	<b>Dr.Sirwan T.Othman</b>
<b>3. Department/ College</b>	<b>Chemistry/ Science</b>
<b>4. Contact</b>	<b>e-mail- Sirwan.Othman@su.edu.krd</b>
<b>5. Time (in hours) per week</b>	<b>Theory: 2h Practical: 3 groups, total 9h</b>
<b>6. Office hours</b>	
<b>7. Course code</b>	<b>None</b>
<b>8. Teacher's academic profile</b>	<b><a href="https://sites.google.com/a/su.edu.krd/Sirwan-Taha-2021-2022">https://sites.google.com/a/su.edu.krd/Sirwan-Taha-2021-2022</a></b>
<b>9. Keywords</b>	<b>None</b>
<b>10. Course overview:</b>	This course is crucial and recommended for third stage of undergraduate students to understand carbonic compounds as big molecules, so the study will be sufficient and comprehensive. At the end of the year, the student will gain full knowledge about the Organic Mechanism.
<b>11. Course objective:</b>	By the end of the course the students should be able <ul style="list-style-type: none"> <li>• to have a more advanced level of understanding, of both theoretical and practical of Organic Chemistry.</li> </ul>
<b>12. Student's obligation</b>	Students obliged to attend all theoretical lectures and practical sessions for around 14 weeks; quizzes may be given after each chapter completed. The practical sessions are to submit a report for each completed experiment, reviewed and corrected report will be returned to the student.
<b>13. Forms of teaching</b>	<ul style="list-style-type: none"> <li>○ Lecture notes prepared in Microsoft PPT, ChemDraw Ultra for drawings and presented to the students using PowerPoint by Data Show. The lecture indicates, introduction, brief review of the last lecture, explain every slide shown, troubleshooting, solve sample questions. Lecture ends with questions/answers and or quiz.</li> <li>○ The notes usually uploaded for the students on the e-Learning website.</li> <li>○ After every exam assigned for the students, questions are corrected, marks rewarded, and the following lecture will be discussion to solve the exam questions. Exam answer papers are to be saved for future references.</li> <li>○ The exam paper covers most of the lectures given and indicated: Exam instructions, MCQ, definitions, chemical equations, explanations, Draw, give reasons, calculations, comparisons...etc. The questions are usually clear, direct and obvious, starting from easy, medium to hard.</li> </ul>

<p>○ All student marks including attendance and quizzes shall be displayed on the department notes board. All year student effort will be calculated and added to the summer exam along with the practical marks out of a 100%.</p>	
<p><b>14. Assessment Scheme</b> The whole course marks out of 100%, breaking down to 40 marks (15 mark for exams including quizzes and classroom activity, and 35 marks for practical) plus 60 marks for final theory exam (60 mark sitting exam).</p>	
<p><b>15. Student learning outcome:</b> The students will learn from the lecturer, also from the E-lectures and other sources of information including the Educational Websites, books from the library, YouTube and ..... etc.</p>	
<p><b>16. Course Reading List and References:</b></p> <p>Books from Library.</p> <p>1- Organic Chemistry: Morrison and Boyd 2- Organic Chemistry fourth edition. By Francis A. Carey 9- Organic chemistry by J.S. Fessenden, J.S. Fessenden (4<sup>th</sup> edition) 10- The Chemistry of Heterocycles, Second Edition. By Theophil Eicher and Siegfried Hauptmann, Copyright © 2003 Wiley-VCH Verlag GmbH &amp; Co. KGaA 11- Heterocyclic Chemistry by John A. Joule, Keith Mills 12- Handbook of Heterocyclic Chemistry” 2<sup>nd</sup> Edition, 2000, Pergamon/Elsevier by A. R. Katritzky and A. F. Pozharski 13- Handbook of Heterocyclic Chemistry” 3<sup>rd</sup> Edition by Alan R. Katritzky, Christopher A. Ramsden, John A. Joule 14- Heterocyclic- pdf (Synthesis of heterocyclic compounds), Tapio Nevalainen, 15- Drug synthesis II, 2010, (<a href="http://www.scripps.edu/chem/baran/heterocycles/">http://www.scripps.edu/chem/baran/heterocycles/</a>) 16- Essentials of Heterocyclic Chemistry-III, by Baran, Hafensteiner, Richter (pdf)</p> <p>From Google Internet Search (<a href="http://www.google.com">www.google.com</a>)</p> <p>And Journals</p>	
<p><b>17. The Topics of first course:</b></p> <p>Week1-2: Rearrangement and effect of Neighboring group Week3: Pinacol pinacolone Week 4,5: Carbanion Aldol condensation Week 6: Claisen Ester Condensation Week 7: Reformatesky Organo Metallic Reagent Week 8,9: Enolates Week 10: Alpha, Beta-unsaturated carbonyl compounds Week 11,12: Aryl Halide</p>	<p><b>Lecturer's name</b> Dr.Sirwan T.Othman</p>

<p>Week 13,14: Heterocyclic chemistry, five membered ring, six membered ring. Week 15,16: Polynuclear aromatic compounds, Naphthalene synthesis and derivatives.</p>	
<p><b>18. Practical Topics (If there is any)</b></p>	
<p>Organic chemistry experiments including: Each Wednesday and Thursday a 3h practical session will be compulsory for student to practice. Experiments are related to preparation of organic compounds.</p> <p><b>Experiment titles:</b></p> <ol style="list-style-type: none"> <li>1-Hoffman degradation</li> <li>2- Benzil rearrangement</li> <li>3-Preparation of pinacol</li> <li>4-Pinacol rearrangement</li> <li>5-Preparation of Schiff base</li> <li>6-Praparation of quinoxalin</li> <li>7-Preparation of Aryl Halide</li> <li>8-Preparation of Anthraquinone</li> <li>9-Deils Alder reactions</li> <li>10- Aldol condensation</li> <li>11-Preparation of Isoborneol</li> </ol>	<p>Dr. Sirwan taha 9h Jala Bahjet 18h Naween Mushir 18h</p>
<p><b>19. Examinations: Theory</b></p> <p><b>Sample Question paper given to students</b></p> <p><b>University of Salahaddin</b>      3<sup>rd</sup> stage organic chemistry exam. Time allowed 1.5 hr.</p> <p><b>Science College, Chemistry department.</b> (Answer all questions on this paper). <b>Student name:</b></p> <p>Q1. Complete the equation below:</p>	



Answer:



benzalacetophenone

diethylmalonate

Q2) Explain briefly why?

1- Organozinc reagent is used instead of Organomagnesium in some Chemical reactions?

The formation of organozinc compound is similar to the Grignard reagent. Zinc is used in place of magnesium simply because the organozinc compounds are less reactive than Grignard reagent they do not react with ester function but only with aldehyde or ketone.

## 19. Examinations: Practical Part

Q1) Define the following:

Dienophile, Benzilic acid rearrangement

Q2) Discuss why most alcohols are resistant to dehydration by base, but aldol products dehydrate easily?

Q3) Write the reaction of  $\text{NaNO}_2/\text{HCl}$  with the following compounds and explain which one has the more stable diazonium salts.

$\text{H}_3\text{CH}_2\text{NH}_2$

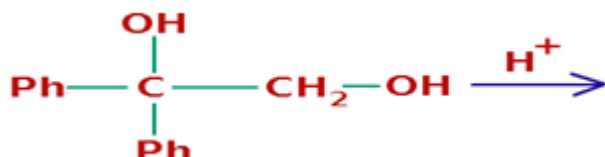
$\text{H}_3\text{-NH-C}_2\text{H}_5$

$\text{C}_6\text{H}_5\text{-NH}_2$

**Q4) Complete these reactions:**

1. Anthraquinone  $\xrightarrow{\text{K}_2\text{Cr}_2\text{O}_7/\text{H}_2\text{SO}_4}$
2. Cyclopentadiene + Maleic anhydride  $\longrightarrow$
3. Benzaldehyde + Acetone  $\xrightarrow{\text{NaOH}}$

**Q5) Write the mechanism for the following reaction:**



**20. Extra notes:**

None.

**21. Peer review** پڻ داچوونئو هيهاو ڏن

This course book has to be reviewed and signed by a peer. The peer approves the contents of your course book by writing few sentences in this section.

(A peer is person who has enough knowledge about the subject you are teaching; he/she has to be a professor, assistant professor, a lecturer or an expert in the field of your subject).

ئهم ڪورس بڪو ڪه ڊهه بڻائڻ لاءِ ڏيکڻا هون ٿا ڪيئن ڪا ڊيميٽو هسٽر بڪر ٿي ٿو ٺاهي ڇوڪي يا بهت ڪانڪي ڪورس ڪه ڀهه سندن بڪا ٿو جهنڊو و شهيڪ بنوس ٿي ٿلهه سهر شي اوڻيا و ڇوڪي ڪورس ڪه و واڙو و لاهه بڪا ٿي.

هاو ڏنئو ڪه سهيڪهز انيار ڀهه بڻائڻ لاهه ڪورس ڪه ڊهه بڻائڻ لاهه انستيل همام و سٽاڪه مٽر نه بڻائڻ.