

Ministry of Higher Education and Scientific research



Department of Chemistry

College of sciences

University of Salahaddin

Subject: Practical Organic Chemistry

Course Book: (Year 3)

Lecturer's name: Pshtiwan Adel Masum

Academic Year: 2022/2023

Course Book

1. Course name	Practical Organic Chemistry
2. Lecturer in charge	Pshtiwan A. Masum
3. Department/ College	Chemistry / sciences
4. Contact	e-mail: pshtiwan.masum@su.edu.krd
5. Time (in hours) per week	Practical: 15 hours
6. Office hours	(3X2)hrs
7. Course code	
8. Teacher's academic profile	<p>1-(2005-2006) B.Sc. in natural products chemistry from Salahaddin University\ college of Science \ Chemistry department.</p> <p>2-(2012) M.Sc. In Natural product \ Salahaddin University \ College of Science.</p>
9. Keywords	Practical, rearrangement, Hoffman, Pinacol, Schiff base
<p>10. Course overview:</p> <p>The major objective of this study was to offer an overview of the current situation in the course practical organic chemistry. All semester chemistry students, laboratory instructors and Practical Organic Chemistry course material were involved as the main source of data. The main instruments used to collect the necessary data were questionnaires and content analysis of the course material. Observation was another instrument of data collection. Qualitative and quantitative methods were employed to analyze data. The results indicated that the majority of the activities have lower inquiry level of one and the dominant practical work identified was demonstration type activity. Moreover laboratory instructors and students ranked the most important objective of the manual—to demonstrate materials taught in lecture—least. Based on these findings certain recommendations were forwarded. Chemistry laboratory activities refer to the practical activities which students undertake using chemicals and equipments in a chemistry laboratory. Inquiry level is a multifaceted activity that involves making observations; posing questions; examining books and other sources of information to see what is already known; planning investigations; reviewing what is already known in light of experimental evidence; using tools to gather, analyze, and interpret data; proposing answers, explanations, and predictions; and communicating the results. Objective in laboratory instructions is a term which refers to what to be taught, who is to be taught to, by what means, and most importantly, what are the intended outcomes.</p> <p>Chemistry is essentially a laboratory activity oriented subject. No course in chemistry can be considered as complete without including practical work in it. Laboratory activity, here, is used to describe the practical activities which students undertake using chemicals and equipment in a chemistry laboratory. The original reasons for the development of laboratory work in chemistry education lay in the need to produce skilled technicians for industry and highly competent workers for research laboratories.</p> <p>Some also classify practical works in to four major types: exercises, experiences, demonstrations and investigations. Each of these types of practical has its own place in science teaching.</p> <p>The major objective of this study was to offer an overview of the nature of Practical Organic Chemistry I offered by the Department of Chemistry in Salahaddin University. The specific objectives of the study were:</p> <ol style="list-style-type: none"> 1. To evaluate the types of objectives of the selected activities 2. To assess the inquiry levels assigned to the laboratory tasks 	

3. To measure the relevance of the activities in terms of the recent concern, students' interest and instructors reaction to what should be the objectives of the laboratory tasks.

11. Course objective:

The course will cover the basic view about the organic chemistry including the basic terms of organic chemistry in addition to increase the knowledge of student about the types of physical properties, chemical and type of reaction a Different forms of teaching will be used to reach the objectives of the course: power point presentations for the head titles and definitions and summary of conclusions, besides worksheet will be designed to let the chance for practicing on several aspects of the course in the lab, furthermore students will be asked to prepare research papers on selective topics and summarise articles contents published in English into either Kurdish or Arabic language, those articles need to be from printed media or internet articles. There will be lab discussions and the lecture will give enough background to translate, solve, analyze, and evaluate problems sets, and different issues discussed throughout the course.

12. Student's obligation

The students responded above average for most items. However, it was identified that students look difficulty to grasp the aim and understand the importance of the activities. Further it was found more satisfying and gave confidence if the lessons were well structured and student directed. On top of these most students wish organic chemistry laboratory to be a place where they could practice scientific investigations.

13. Forms of teaching

Learning resources in this course include white board and PowerPoint presentations.

14. Assessment scheme

The students are required to do three practice exams along the year. The exams have 7mark, the report for each experiment attendance; classroom activities 8mark (total 15 mark). Final examination: 15%

15. Student learning outcome

- Learn about nucleophilic substitution and elimination reactions. Students will be expected to be able to discuss concepts and answer questions on exams and problem sets as well as apply these concepts to a laboratory experiment and properly interpret the results on written lab reports. Students will be able to analyze reaction conditions that favour each reaction as well as understand the mechanistic principles of each of the reactions.

- Understand the reactions of carbonyl containing compounds (nucleophilic addition to carbonyls, nucleophilic acyl substitution, and carbonyl condensation reactions) that makes them important reactants in organic synthesis. Students will be expected be able to predict the outcomes of these reactions as well as show a full understanding of their reactions mechanisms.

The principal learning outcome of demonstration activities is to help the student grasp the theoretical understanding of the course and to demonstrate materials taught in lecture and promote interest in chemistry and in learning science and introduce equipment's and develop

16. Course Reading List and References:

Vogel's Textbook of Practical Organic Chemistry. B. S. Furniss. EIBS and Longman, London.

The core materials of the course consist of the above book, articles from media and internet, and lecture's notes, make sure you read all the materials and prepare well before going for the examinations.

Students are encouraged to search for any other materials that may help improve their English language ability in reading, writing, listening and speaking organic chemistry texts.

17. The Topics:

Lecturer's name

This field not filled because I don't have theoretical lecture. The next field shows the practical topics.

18. Practical Topics (If there is any)

Experiment titles

1-preparation of Benzamide and benzanilide

2-Hydrolysis of benzamid

3-Nitration of benzamide and benzanilide

4-Hoffman degradation

5- Benzil rearrangment

6-Preparation of pinacol

7-Pinacol rearrangement

9-preparation of schif base

10-praparation of quinoxalin

12-preparation of Isoborneol

13-Aryal Halde

14-preparation of anthraquinone

15-Deils Alder

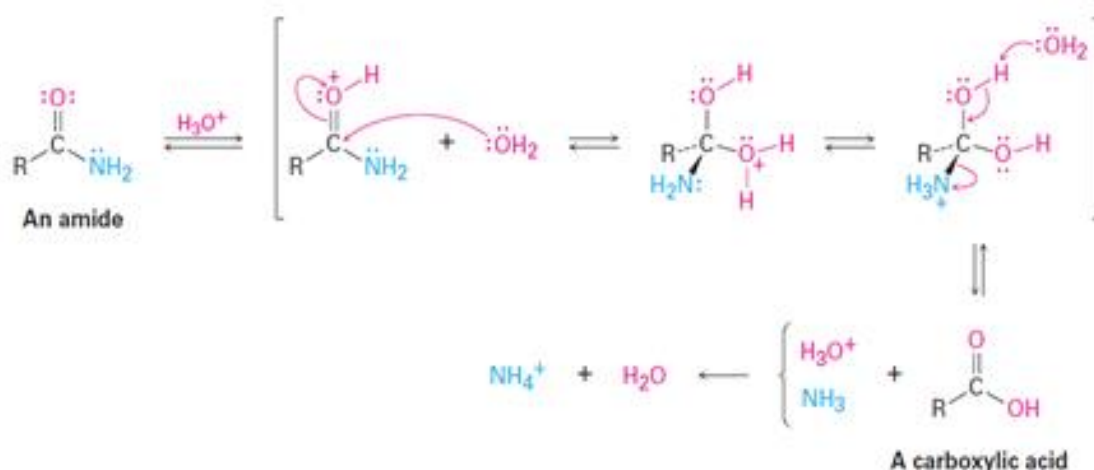
16- Aldol condensation

Pshtiwan A. Masum
3hr

From 11/2022
To 5/2023

19. Examinations:

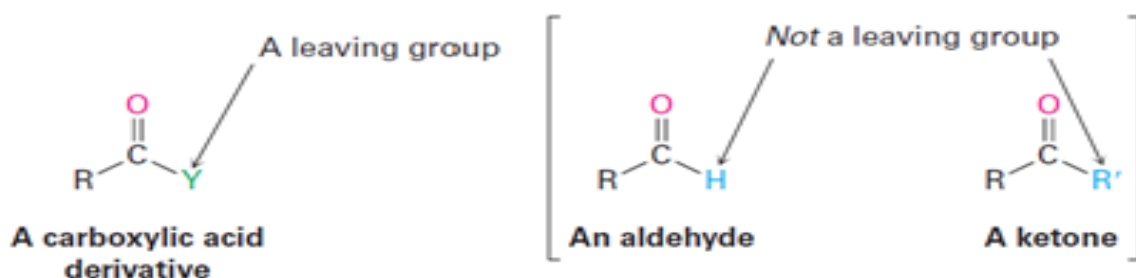
Q1/ write the hydrolysis mechanism of an amide in acidic medium



Q2/ Aldehydes and ketones don't undergo substitution reactions, while carboxylic acid derivatives undergo substitution reactions?

The difference in behavior between aldehydes/ketones and carboxylic acid derivatives is a consequence of structure. Carboxylic acid derivatives have an acyl carbon bonded to a group -Y that can act as a leaving group, often as a stable anion.

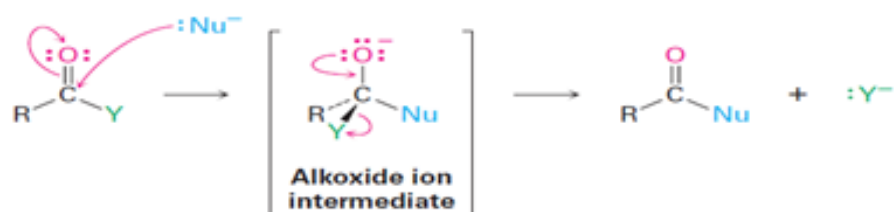
Aldehydes and ketones have no such leaving group, however, and therefore don't undergo substitution.



(a) Aldehyde or ketone: nucleophilic addition



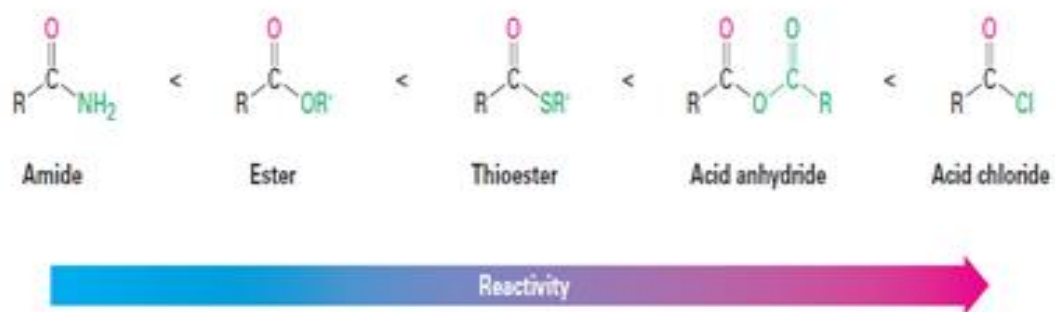
(b) Carboxylic acid derivative: nucleophilic acyl substitution



We can see **why the two classes of compounds differ as they do**.
 The ease with which ($:Y^-$) is lost depends upon its basicity: the weaker the base, the better the leaving group.

Q3/ rank the following compounds toward reactivity with substitution reaction

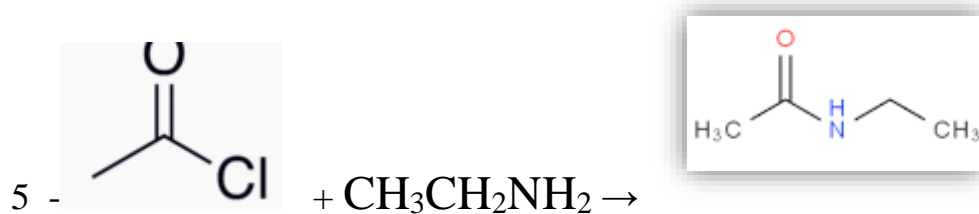
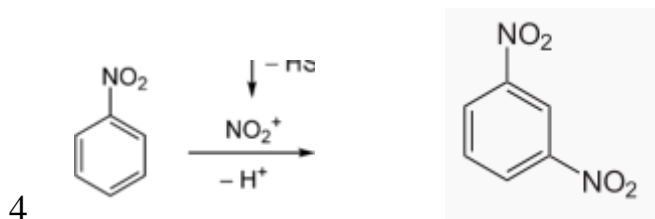
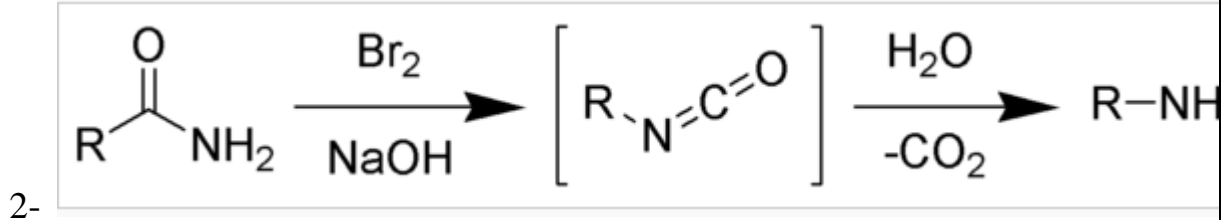
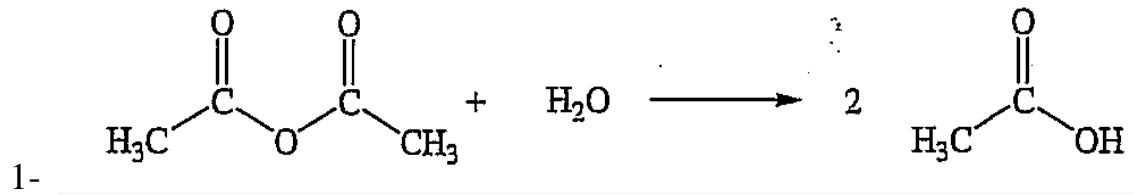
Ester, acid chloride, amide, thioester, acid anhydride



Q4/ Draw and Complete the following chemical reactions:

- 1- Acetic anhydride + H₂O / H⁺ →
- 2- Acetyl chloride + BuMgBr → + BuMgBr →
- 3- Amide + Bromine/sodium hydroxide → →
- 4- Nitrobenzene + H₂SO₄/HNO₃ →
- 5- C₂H₃OCl(A) + C₂H₇N(B) → C₄H₇ON(C)

Answer



Q5/ Define the followings:

1- Hofman rearrangement

Hofmann degradation, also known as Hofmann rearrangement, is the reaction of a primary amide with a halogen (chlorine or bromine) in strongly

basic (sodium or potassium hydroxide) aqueous medium, which converts the amide to a primary amine with one carbon atom fewer.

2- Diels Alder reaction

Is the 1, 4-addition of an alkene to conjugate dienes it's called

- 3- **Jablosnky** :The Jablonski diagram describes most of the relaxation mechanisms for excited state molecules One molecule is excited into an electronically excited state by absorption of a photon, it can undergo a number of different primary processes

20. Extra notes:

Lecture and student must have good corporation to success learning process.

21. Peer review .