

SUBJECT OUTLINE DETAILS

1. Subject: Experiments of Organic Chemistry (Thực tập Hóa học Hữu cơ)

- Code: CH355C
- Credits: 2 credits
- Hours: 60 practice hours

2. Management Unit:

- Department: Chemistry
- Faculty: The Colledge of Natural Sciences

3. Prerequisites: CH351C and CH352C Organic Chemistry I and II

4. Subject objectives:

4.1. Knowledge:

- 4.1.1. Organic laboratory techniques support for students with principal knowledge in organic experiments such as: distillation, measuring physical properties: melting points, recrystallization, chromatography, and synthesis.
- 4.1.2. Understanding about effects of organic chemistry to social and environment.

4.2. Skill:

4.2.1. Hard skills

Understanding of important role of organic chemistry to country's development.

Use the modern spectroscopy methods: MS, NMR, UV-Vis, IR, ...to analysis chemicals.

Suggest and build the research models in chemistry to support and solve the problems related to chemistry.

4.2.2. Soft skills

Help students find their way to the chemical and biology library easily and their ability to refer or, and generally does indepth reasearch into the topic they are interested in.

Enable working independently or in team and self-study in their lives.

4.3. Attitude:

- 4.3.1. Construction students have a healthy and civilized lifestyle. To respect the law. Loyalty to the country always.
- 4.3.2. To have an inquiring mind, the will to work for progress, Good team work, good attitude, cordial spirit, cooperation with colleagues in the work.

4.3.3. . Strictly observe discipline and more dissemination on environmental issues, mobilization of citizen's contribution for and improvement of citizens' participation in environmental protection, increase the citizen's environmental awareness.

5. Brief description of subject content:

Organic laboratory techniques: distillation, measuring physical properties: melting points, recrystallization, chromatography, and synthesis. Students can know and carry out the synthesise procedures of organic compounds and the methods to determine the structures of synthesized compounds.

6. Subject content structure:

6.1. Theory

	Content	Hours	Objectives
Chapter 1.	...		
1.1.
1.2.
1.3.
....
Chapter 2.	...		
2.1.
2.2.
...

6.2. Practice

	Content	Hours	Objectives
Unit 1. Recrystallization and Sublimation		5	4.1.1; 4.1.3;
1.1.	Recrystallization of Benzoic acid Sự kết tinh của Benzoic acid		
1.2.	Sublimation of Benzoic acid Sự thăng hoa của Benzoic acid		
1.3.	Determining Capillary-Tube Melting Points Xác định điểm nóng chảy bằng ống mao quản		
Unit 2. Fractional Distillation: Distillation of ethanol from a Binary Mixture		5	4.1.1; 4.1.3;
2.1.	Boiling Points of Pure Liquids Điểm sôi của chất lỏng tinh khiết Simple distillation of tape water		
2.2.	Chưng cất đơn nước		
2.3.	Fractional distillation of ethanol-water mixture Chưng cất phân đoạn etanol từ hỗn hợp etanol và nước		
Unit 3. Extraction: Extraction of caffeine from tea		5	4.1.1; 4.1.3;
3.1.	Theory of Extraction		
3.2.	Technique of liquid-liquid extraction: Isolation of caffeine from tea		

Unit 4. Column and Thin Layer Chromatography	5	4.1.1; 4.1.3; 4.2.
4.1. Packing the chromatography column		
4.2. Chromatography of pigments from an extracted solution of plant leaves.		
Unit 5. Qualitative Analysis of Organic Functional Groups	5	4.1.1; 4.1.3; 4.2.
5.1. Alcohol		
5.2. Aldehyde		
5.3. Ketone		
5.4. Acid		
5.5. Ester		
Unit 6. Determination of physical Constants of Organic Compounds	5	4.1.1; 4.1.3;
6.1. Liquids: Boiling Point, Density		
6.2. Solids: Melting Points		
Unit 7. The Sulfonation Reaction: Preparation of Sodium <i>p</i>-Toluenesulfonate	5	4.1.1; 4.1.3;
7.1. Reaction		
7.2. Discussion		
7.3. Experimental Procedure		
Unit 8. The Esterification Reaction: Preparation of Aspirin from Salicylic Acid	5	4.1.1; 4.1.3;
8.1. Reaction		
8.2. Discussion		
8.3. Experimental Procedure		
Unit 9. The Esterification Reaction: Preparation of Isopamyl Acetate	5	4.1.1; 4.1.3;
9.1. Reaction		
9.2. Discussion		
9.3. Experimental Procedure		
Unit 10. Aldol Reaction: Dibenzalacetone	5	4.1.1., 4.1.2.
10.1. Reaction		
10.2. Discussion		
10.3. Experimental Procedure		
Unit 11. Diazotization: Azo Dye Synthesis and Polymer Synthesis	5	4.1.1., 4.1.2. 4.1.3; 4.2.
11.1. Reaction		
11.2. Discussion		
11.3. Experimental Procedure		
Unit 12. The Oxidation Reaction: Benzoic Acid	5	4.1.1., 4.1.2.
12.1. Reaction		
12.2. Discussion		
12.3. Experimental Procedure		

7. Teaching method:

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- Twelve experiments are divided into 2 parts, 6 experiments/each (Part1 from experiment (exp.) 1 to 6, and Part 2 from exp. 7 to 12.
- Six groups of students. 2-4 students/group, among them is divided into subgroups, 2 students/subgroup. Every week one group do one experiment, 6 groups do 6 exp. at the same time. After that rotation about until finish part 1, and so do for part 2.
- The next experiment, student have to prepare for the new experiment, refer on experiment books, internet,... , report on the old experiment.
- During the working time, teacher will ask the related experimental questions and estimate experimental technique,...

8. Duties of student:

Students have to do the following duties:

- present at all experimental hours
- organize, prepare and implemen self-study activities.

9. Assessment of student learning outcomes:

9.1. Assessment

Evaluating student's study following cumulative results of credits.

No.	Point components	Rules and Requirement	Weights	Objectives
1	Present	Work on time	20%	4.3
2	Self-study and refer documents	Solved and demonstrated the related documents	30%	4.2.1; 4.2.4; 4.3
3	Mark on daily oral questions	- Report/represent/... - Contributed	40%	4.2.2; 4.2.5; 4.2.6; 4.3.
4	Mark on experimental technique	- Have good labor skills. Fire, explosive and environment safety	10%	4.1.1 to 4.1.4; 4.2.1

9.2. Grading

- Grading components and final test scores will be marked on a scale of 10 (0 to 10), rounded to one decimal place.
- Subject score is the sum of all the components of the evaluation multiplied by the corresponding weight. The subject score is marked on a scale of 10 and rounded to one decimal place, then is converted to A-B-C-D score and score on a scale of 4 under the academic provisions of the University.

10. Materials:

Materials information

Code number

[1] Experimental **organic chemistry** : A miniscale & microscale approach. / John C. Gilbert and Stephen F. Martin.- 4th.- Belmont, CA: Thomson Brooks/Cole, 2006.- xxi, 927 p. ; ill., 29 cm, 9780495013341.- 547.0078/ G465

Chi tiết

MFN: 131706

[2] Modern projects and experiments in **organic chemistry** : Miniscale and standard taper microscale / Jerry R. Mohrig ... [et al.].- 2nd ed..- New York, N.Y.: W. H. Freeman, 2003.- 397 p., 28 cm.- 547.0078/ M689

Chi tiết

MFN: 104245

[3] Vogel's textbook of **practical organic chemistry** / Arthur Israel Vogel, Brian S Furnis [et al.].- 5th.- London: Longman, 1989, 1514p., 0 582 46236 3.- 547/ V15 ...

Chi tiết

MFN: 19209

[4] Macroscale and **microscale organic** / Kenneth L. Williamson.- 2nd.- Lexington, Mass: D.C. Heath, 1994.- xvii, 765 p. ; ill., 25 cm, 0669243469.- 547.0078/ W729 ...

Chi tiết

MFN: 148779

11. Self-study Guide:

Week	Content	Theory (hours)	Practice (hours)	Students' duties
1	Unit 1: Recrystallization and Sublimation 1.1. Recrystallization of Benzoic acid 1.2. Sublimation of Benzoic acid 1.3. Determining Capillary-Tube Melting Points	0	5	Student will study the experiment carefully before carrying it out with the contents: - in the reference book 1 from page 93 to page 119. - in the reference book 2 from page 183 to page 216. Group working: students have to prepare together for the new experiment, refer on experiment books, internet,... to obtain physical and chemical properties related to compounds in their experiments.
2	Unit 2: Fractional Distillation: Distillation of ethanol from a Binary Mixture 2.1. Boiling Points of Pure Liquids 2.2. Simple distillation of ethanol-water mixture 2.3. Fractional distillation of ethanol-water mixture	0	5	Student will study the experiment carefully before carrying it out with the contents: - in the reference book 1 from page 127 to page 149. - in the reference book 2 from page 141 to page 172. - Write report on experiment 1. Group working: students have to prepare together for the new experiment, refer on experiment books, internet,... to obtain physical and chemical properties related to compounds in their experiments.
3	Unit 3: Extraction: Extraction of caffeine from tea 3.1. Theory of Extraction 3.2. Technique of liquid-liquid extraction: Isolation of caffeine from tea	0	5	Student will study the experiment carefully before carrying it out with the contents: - in the reference book 1 from page 153 to page 171. - in the reference book 2 from page 113 to page 131. - Write report on experiment 2. Group working: students have to prepare together for the new experiment, refer on experiment books, internet,... to

				obtain physical and chemical properties related to compounds in their experiments.
4	Unit 4: Column and Thin Layer Chromatography 4.1. Packing the chromatography column 4.2. Chromatography of pigments from an extracted solution of plant leaves.	0	5	Student will study the experiment carefully before carrying it out with the contents: - in the reference book 1 from page 179 to page 194. - in the reference book 2 from page 235 to page 250. - Write report on experiment 3. Group working: students have to prepare together for the new experiment, refer on experiment books, internet,... to obtain physical and chemical properties related to compounds in their experiments.
5	Unit 5: Qualitative Analysis of Organic Functional Groups 5.1. Alcohol 5.2. Aldehyde 5.3. Cetone 5.4. Acid 5.5. Ester	0	5	Student will study the experiment carefully before carrying it out with the contents: - in the reference book 1 from page 883 to page 904. - Write report on experiment 4. Group working: students have to prepare together for the new experiment, refer on experiment books, internet,... to obtain physical and chemical properties related to compounds in their experiments.
6	Unit 6: Determination of physical Constants of Organic Compounds 6.1. Liquids: Boiling Point, Density 6.2. Solids: Melting Points	0	5	Student will study the experiment carefully before carrying it out with the contents: - in the reference book 1 from page 27 to page 92. - in the reference book 2 from page 174 to page 182. - in the reference book 3 from page 236 to page 250. - Write report on experiment 5. Group working: students have to prepare together for the new experiment, refer on experiment books, internet,... to obtain physical and chemical properties related to compounds in their experiments.
7	Unit 7: The Sulfonation Reaction: Preparation of Sodium <i>p</i>-Toluenesulfonate 7.1. Reaction 7.2. Discussion 7.3. Experimental Procedure	0	5	Student will study the experiment carefully before carrying it out with the contents: - in the reference book 1 from page 883 to page 904. - Write report on experiment 6. Group working: students have to prepare

				together for the new experiment, refer on experiment books, internet,... to obtain physical and chemical properties related to compounds in their experiments.
8	Unit 8: The Esterification Reaction: Preparation of Acetyl-salicylic Acid (Aspirin) from Salicylic Acid 8.1. Reaction 8.2. Discussion 8.3. Experimental Procedure	0	5	Student will study the experiment carefully before carrying it out with the contents: - in the reference book 4 from page 529 to page 534. - Write report on experiment 7. Group working: students have to prepare together for the new experiment, refer on experiment books, internet,... to obtain physical and chemical properties related to compounds in their experiments.
9	Unit 9: The Esterification Reaction: Preparation of Isopamyl Acetate 9.1. Reaction 9.2. Discussion 9.3. Experimental Procedure	0	5	Student will study the experiment carefully before carrying it out with the contents: - in the reference book 4 from page 520 to page 522. - in the reference book 3 from page 695 to page 702. - Write report on experiment 8. Group working: students have to prepare together for the new experiment, refer on experiment books, internet,... to obtain physical and chemical properties related to compounds in their experiments.
10	Unit 10: Dibenzalacetone Aldol Reaction: Dibenzalacetone 10.1. Reaction 10.2. Discussion 10.3. Experimental Procedure	0	5	Student will study the experiment carefully before carrying it out with the contents: - in the reference book 4 from page 484 to page 489. - Write report on experiment 9. Group working: students have to prepare together for the new experiment, refer on experiment books, internet,... to obtain physical and chemical properties related to compounds in their experiments.
11	Unit 11: Diazotization: Azo Dye Synthesis and Polymer Synthesis 11.1. Reaction 11.2. Discussion 11.3. Experimental Procedure	0	5	Student will study the experiment carefully before carrying it out with the contents: - in the reference book 3 from page 920 to page 952. - in the reference book 1 from page 765 to page 781. - Write report on experiment 10.

				Group working: students have to prepare together for the new experiment, refer on experiment books, internet,... to obtain physical and chemical properties related to compounds in their experiments.
12	Unit 12: The Oxidation Reaction: Benzoic Acid 12.1. Reaction 12.2. Discussion 12.3. Experimental Procedure	0	5	Student will study the experiment carefully before carrying it out with the contents: - in the reference book 3 from page 1057 to page 1060. - Write report on experiment 11 and 12. Group working: students have to prepare together for the new experiment, refer on experiment books, internet,... to obtain physical and chemical properties related to compounds in their experiments.

**ON BEHALF OF RECTOR
DEAN/ DIRECTOR**

Can Tho,/...../20...

HEAD OF DEPARTMENT