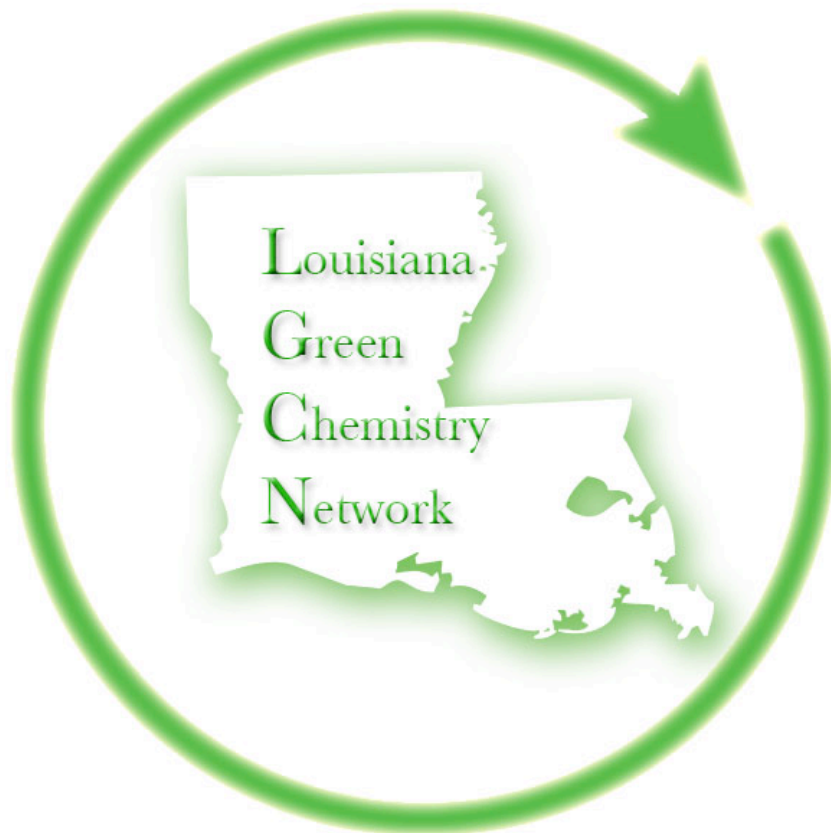


ORGANIC II LABORATORY CHEM A303

**INSTRUCTOR:
KURT BIRDWHISTELL section 021**

SPRING 2008

**BLACKBOARD SITE:
08S-CHEM-A303-021-KRB**



**Theme for Spring of 2008
Green Approaches to Organic
Chemistry**

Syllabus for CHEM 303-021 Spring 2008 (Organic Chemistry Lab II)

Course Objective: Enhance the knowledge base of the students in the application of organic chemistry. Increase student skills in the application of spectroscopy and synthesis for the identification of organic molecules.

PREREQUISITE: CHEM A300 and A305

Corequisite: CHEM A301

Instructors: Dr. Kurt R. Birdwhistell

Office: **Monroe 217**; Office Hours M, W 10:30-11:30; Friday 1:00-2:00, or you can call and make an appointment .

- **Office Phone:** 865-3272,
- **EMAIL:** birdwhis@loyno.edu, I check my email everyday.
- **Blackboard site:** 08s-Chem-a303-021-krb

Go To: <http://blackboard.loyno.edu> , you should all be registered for the course and can log in.

- **PLACE:** Monroe 104
- **TIME:** Lab will be: **Tuesdays 9-12 PM**
Thursdays: 9-12 PM
- **TEXT:** No Required text for this course.

On Reserve: D. J. Pasto, C. R. Johnson, "Laboratory text for Organic Chemistry", Prentice Hall, 1979.

Required FOR LAB

- 1. Safety Glasses**
- 2. Lab Notebook:**
- 3. Lab Manual for Chem A303, Receive on first day of class**

Absences/Late Policy:

WE WILL TAKE ROLL AT THE BEGINNING OF CLASS. TWO ABSENCES WILL DECREASE GRADE BY **ONE LETTER GRADE**. **TARDY** WILL DECREASE LAB DAILY GRADE BY **20 POINTS EACH Day**.

We need to get started on time to finish many of these procedures within the allotted time.

List of Experiments and Assigned Readings

Abbreviations for references:

Br. = Bruice "Organic Chemistry", 5th ed

PJ= Pasto, Johnson "Lab text for Organic Chemistry" **On Reserve**;

CHE= Cheronis, et.al. "Semimicro Qualitative Organic Analysis" **On Reserve**

- | Dates | Experiment Names |
|--------------------|--|
| 1. 1/8 T | Lecture on IR, IR Exercise (see handout, (Br , 530-48),
IR Tables A21-23) pgs 6-21 KBr pellet IR exercise /// |
| 2. 1/10 Th | NMR Lec/ Practise on unknown alcohols,
(Br , p 569-92, HNMR TABLE P.580),
C13 NMR data tablep. 611(Br p. 610-13). CHECK IN // |
| 3. 1/15, T | Lec on Determination of Unknown Esters, p. 757
Finish NMR Exercise, Turn In IR Exercise |
| 4. 1/17, Th | Experiment on Determination of Unknown Esters Br p.757
QUIZ 1 on NMR+ IR |
| 5. 1/22, T | Finish Determination of Unknown Esters, Br p.757,
Finish NMR of Ester, |
| 6. 1/24, Th | Lec Mass Spec, Start MS Exp. (Br p 512-28)
Mass Spec tables (A-18-19, Br) |
| 7. 1/29, T | Finish, Mass spec of unknowns, MS of Ester
Lecture on Wittig Reaction,(Br, p 822-5) |
| 8. 1/31 Th | First part of Wittig Lab, (Br, p 822-5)
Turn in Unknown Ester Lab Report |

Mardi Gras Holidays Feb. 2- Feb.10

- | | |
|---------------------|--|
| 9. 2/12, T | Exp: Finish prep. of t-stilbene by Wittig Reaction, pgs 822-5
Turn in Mass Spec Lab |
| 10. 2/14, Th | Lec on Catalytic Hydrogenation(Br, 188-92), UV-Vis SPEC,
(Br 549-55), Stilbene spectra, QUIZ 3 |
| 11. 2/19, T | Exp: on Catalytic Hydrogenation of t-stilbene, pgs
Spectroscopy for t-stilbene, |

12. **2/21, Th** **Quiz 4**, finish Hydrogenation lab, Lecture on Acetylferrocene (Br, p 660-63)
13. **2/26 T** **Do Acetylferrocene LAB (Green chemistry Lab)**, Acetylferrocene, green lab
14. **2/28, Th** **Do Acetylferrocene/Chromatography, Quiz 5** Br 660-63.
15. **3/4, T** Lec on Qualitative Analysis, Finish Acetylferrocene. Start Qualitative Analysis
16. **3/6, Th** **Qualitative Analysis**, start Exp. pgs **92-5**, Distillation of Unknowns
17. **3/11, T** (**Limited Unknowns**), **AcFc report due**, preparation of derivatives
Lec on Qualitative Analysis, **PJ** p 335-36;
Derivatives ketones (**PJ** 416-17), , amines 453-55
18. **3/13 Th** **Limited unknowns finish**
(CHE 593, 444) ; acids 431-33, (CHE 447);
ROH p382-83 (CHE 467, 485), **Lecture on Separation/isolation**
3/17-3/24 Easter Holidays
19. **3/25 T** **LEC ON QUALITATIVE** , Start unlimited unknowns, ,
ANALYSIS Separations QUIZ 6
20. **3/27, Th** Start unlimited unknowns, Limited Unknown Report Due
21. **4/1, T** Unlimited Unknowns, **PJ** p 84-85, 340-41), pgs 96-8
22. **4/3, Th** Unlimited Unknowns,
23. **4/8-4/17 UNLIMITED UNKNOWNNS, FINISH**
24. **4/22, T** **Final Quiz, CLEAN UP ! Its OVER!!**
Turn In Lab books!

Grading-

a. Daily Grade(30%) CONSISTS OF THE FOLLOWING:

Tardiness will DECREASE YOUR DAILY GRADE

(Work in your notebook!) I WILL COLLECT YELLOW SHEETS FROM YOUR NOTEBOOKS or grade them in class.

Before you come to class you should have:

- 1) Title of experiment in **BOUND** notebook, DATE
- 2) Objective of Experiment,
- 3) **amounts of Reagents needed**, record reagent supplier(Aldrich, Acros, etc.)

DURING CLASS: note color changes in reaction, temperature changes in reactions, physical changes in reactions(ie. bubbling, gas evolved,solid precipitated, solid suspended in solution, solid melted solid dissolved) weights and volumes of reagents used, melting points, spectroscopic data, calculations of yields,

- 3.) general lab technique(neatness, preciseness, preparedness)
- 4.) In class answers to questions during lab (Do you understand what is happening in lab?)

B. Lab Reports (50%)- handed in on Loose Leaf paper or on

Answer sheets, PRINTED NEATLY OR TYPED will include:

1. Title, Date, Abstract, spectral data and interpretation, physical properties of products(mass, physical state, color, %yield), attach spectra
- 2.) yields (% yield **include calculations**), **balanced chemical equations, structures of reactants and products**
- 3.) **Answers** to assigned questions in back of lab handout
- 4.) **References:** For format see J. Dodd, "The ACS Style Guide" 2ND Ed. on reserve in library.

C. Quizzes (20%)- Seven or eight quizzes based on the reactions and procedures used during lab this semester and material discussed in the lab lecture, questions at the end of each lab, qualitative analysis.

Late Lab Reports/ Lab Reports will be due on the due date. **5% off**

for each day late. **Lab reports will be assigned a ZERO after one week late.**

All Lab Reports Must be Turned in to Pass the Course!

ATTENDANCE : Attendance is **MANDATORY**. You must do all the labs to pass this course.

REFERENCES for physical properties/spectral info on Organic

1. Merck Index, Ed. S. Budavari, Merck and Co., Rahway, N.J., 1989. **RS51.MY 1989**
-Online version at: <http://library.loyno.edu/databases/chemistry.htm>
2. CRC Handbook of Chemistry and Physics, Chemical Rubber Co.; **QD65.H35 1990.**
-Online at : <http://library.loyno.edu/databases/chemistry.htm>
3. CRC Handbook of Tables for Organic Compound Identification, Ed. Rappoport, Z., Chemical Rubber Co. Cleveland OH, 1967. (**QD291.R221 1967**) **ON RESERVE**
4. Aldrich Library of Infrared Spectra Ed.Pouchert, C.J., Aldrich Chemical Co., 1975. (**QC457.P86 1975**)
5. Aldrich Library of NMR Spectra; Ed. Pouchert, C.J. , Aldrich Chemical Co., 1989.; (**QD96.N8P68**), **Aldrich NMR Database on NMR computer, MO 208**
6. Dictionary of Organic Compounds (melting points, other physical data), (**QD246.D5 1982**)
7. Aldrich Catalog/Handbook of Fine Chemicals, Aldrich Chemical Co., 1996
Sigma/Aldrichwebsite(good for NMR and IR information on chemicals in their catalog)
http://www2.sigmaaldrich.com/suite7/Area_of_Interest/The_Americas/United_States.html
8. Silverstein, Bassler, "Spectrometric Identification of Organic Compounds" 1991; (**QD272.s6 s55 1991**) **ON RESERVE**
9. Japanese AIST Spectral Database: http://www.aist.go.jp/RIODB/SDBS/cgi-bin/cre_index.cgi, NMR, MS, IR information.

References on Organic Qualitative Analysis

1. Shriner, Fuson, Curtin, Morrill, "The Systematic Identification of Organic Compounds", John Wiley and Sons, New York, 1980. (**QD261.s5 980**) **ON RESERVE**
2. Cheronis, Entrikin, Hodnett, "Semimicro Qualitative Organic Analysis, The Systematic Identification of Organic Compounds", Interscience Publishers, New York, 1965. (**QD98.c45 1965**) **ON RESERVE**
3. Shriner R. L. , Hermann C. K. F., Morrill T., Curtin D. Y.; ,Fuson R. C. "The Systematic Identification of Organic Compounds", eight Ed. , John Wiley,2004.

STYLE REFERENCES:

“The ACS style guide : a manual for authors and editors” Dodd, Janet S.,
Ed. **On reserve (QD8.5 .A25 1986)**

Abstract Example:

An unknown acetate ester was synthesized using green chemistry principles by the acid catalyzed esterification of acetic acid and an unknown alcohol. The reaction was catalyzed using a polymeric acid (Nafion) in place of the traditional mineral acid and the reaction was heated in a microwave system at 150 °C for 10 minutes to conserve energy. The unknown ester was characterized by bpt, GC/MS, and ¹HNMR spectroscopy. The isolated percent yield of Unknown D was 56%. Unknown alcohol D was determined to be 3-Octanol. The product was 3-octyl acetate.

Example of Correct citation.

The literature mpt is 124-126°C¹.

References:

1. The Merck Index Budavari, S. Ed.; 11th Ed. Merck & Co. Rahway, NJ, 1989, p. 249.

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BROAD GRADING CRITERIA

Grade A: Obtained all usable data and reported accurately

Grade B: Obtained some usable data , reported accurately

Grade C: Obtained no usable data, but completed lab

Grade F : Did not do or complete lab

Grading Scale:

A: 100-90%

B: 89-80%

C: 79-70%

D: 69-60%

F: < 59%

This scale may be changed based on the instructor’s discretion.