CHEMISTRY 260

Spring 2005

Book required : "Spectrometric Identification of Organic Compounds," 6th ed., by Silverstein and Webster (an earlier edition will suffice)

You might want a copy of an instrumental analysis textbook – any will do, and there are a couple on library reserve.

Goals:

A. For the following techniques, which we will concentrate on, you should understand the theory, understand how the instrument works, and be able to interpret the data:

- Ultraviolet and visible spectroscopy
- Infrared spectroscopy (IR)
- Nuclear magnetic resonance (NMR) spectrometry
- Mass spectrometry (MS)
- Atomic absorption spectroscopy (AA)
- Gas chromatography (GC)
- Thin-layer chromatography (TLC)
- High-performance liquid chromatography (HPLC)

B. You should know what the following techniques are and what they are used for:

- Fluorescence spectroscopy
- X-ray and electron spectroscopy
- Polarimetry
- Thermal analysis
- Nuclear methods of analysis
- Electrochemistry

C. You should also be able to:

- Identify an organic compound from its spectra
- Understand how statistics is used in analytical chemistry and interpret a statistical analysis of data
- Write a scientific report

There will be two exams. Exam I will cover spectroscopy; it will be given the week after spring break (March 21-25). There will be no lab that week; the exam may be taken anytime that week, including the regular lab time. It may be taken in one part or two parts. Exam II will cover only those topics covered since Exam I; it may be taken any time the last full week of classes up through reading day (Apr. 25-May 3). It may also be taken as a whole or in two parts. Although writing won't be strictly graded on the exams, if your writing is very poor, your exam grade may be lowered.

There will be a spectroscopy problem set assigned; this is to be treated like a take-home exam. The assignment will be given before spring break and will be due Friday, March 25 (the Friday after spring break). You may use only your book(s) and lecture notes for the problem set. This is not a writing assignment, so you don't have to compose a report.

There will be a final project – each lab will choose one of the instruments and prepare a video illustrating the theory, the operation, and what the results are used for. This will not be graded, but is necessary for passing the course.

The Honor Code applies to the exams, the problem set, and the lab reports. It is permissible to discuss lab reports prior to writing them up, but the report itself must be your work alone (using critiques from other students; see below). The lab report for Experiment III will be written jointly by the group of students who worked together on the experiment. These students will turn in one report and all students in the group will receive the same grade on the report. See the Honor Code handout for more information.

Grading:	Exam I	25 %
	Exam II	25 %
	Problem set	10 %
	Lab	40 %

As this is a writing-intensive course, conferencing and revision are important components. You should turn in a draft of your first two lab reports for me to look over before you turn in these reports for a grade; I will meet with you after I've critiqued your draft and you can revise it. An outline of what should be included in each report will be posted to our class conference.

SCHEDULE

Feb. 2	Experiment I (UV-VIS)
Feb. 9	Experiment II (UV-VIS)
Feb. 16	Experiment III (IR-NMR-MS); rough draft of **Report 1** (Exp. I-II) due
Feb. 23	Experiment III con't. (IR-NMR-MS); **Report 1** (Exp. I-II) due
Mar. 2	Experiment IV (AA); rough draft of **Report 2** (Exp. III) due
Mar. 9	Experiment V (GC); **Report 2** (Exp. III) due
Mar. 16	Spring break; no lab
Mar. 23	No lab; Exam I this week; problem set due on March 21.
Mar. 30	Experiment VI (TLC); **Report 3** (Exp. IV) due
Apr. 6	Experiment VII (HPLC); **Report 4** (Exp. V) due
Apr. 13	Experiment VIII (statistics); **Report 5** (Exp. VI-VII) due
Apr. 20	No lab; **Report 6** (Exp. VIII) due; posters should be complete
Apr. 27	No lab; Exam II this week.

CHEMISTRY 260 LAB

1. Before the lab. You should come into the lab with some knowledge of the experiment to be performed. This means having read the experiment, performed any preliminary calculations necessary, and reviewed your class notes and the relevant textbook sections.

2. During the lab. The experiment must be performed and completed during the lab period. Work efficiently and make good use of your time. You are expected to be present in the lab until the experiment is finished and to participate in all parts. Most of the glassware and chemicals needed can be obtained from the stockroom. Chemical preparation will be carried out in the prep room; use the hood when necessary. The instruments are expensive and must be handled carefully. If an instrument is broken, this not only involves the expense of repairing it, but may also entail down time before service can be arranged.

3. After the lab. Before leaving the lab, all equipment must be cleaned and put away. Any equipment obtained from the stockroom must be returned.

4. Safety. Proper safety precautions must be observed at all times. This means wearing approved safety glasses, no eating or drinking in the lab or instrument room, wearing proper protective clothing (e.g., no sandals), not wearing contact lenses, and no unauthorized experimentation.

5. Reports. All data collected in lab should be recorded in a notebook. All people in a lab will work on the same experiment and instrument. This means everybody must participate in each part of the procedure -- preparation, instrument operation, and clean-up. The report itself is to be your work alone -- any collaboration is a violation of the Honor Code. (For Experiment III, two students will work together to prepare a single report; both students will receive the same grade.) In most cases, there will be only one original record of the data obtained directly from the instrument. If so, one person should turn in the original with his or her report and the others should mention whose report includes this record. If desired, you may copy or photocopy the data for your own report.

6. Report style. A written report is required for each technique investigated. The report is due at the beginning of the lab as noted on the schedule. The report should include:

a. Your name and the names of the others who worked on the experiment.
b. Date of experiment and date of report.
c. Number and title of experiment.
d. Technique and theory.
e. Description of apparatus used.
f. Brief description of the problem investigated.
g. Data (normally organized into tables).
h. Graphs, equations, diagrams, etc., where appropriate.
i. Results
j. Discussion and conclusions.

Reports must be written in proper scientific English -- using passive voice and past tense where appropriate. Reports should be word processed and double-spaced; they must be neat and legible with correct spelling, grammar, and punctuation. Normally, you should avoid writing anything in -- use the word processor instead.

7. Grading. Reports will be graded on a 100-point basis. You will be graded on the report itself (style, organization, completeness), your data, your results. The most important aspect is your writing and your explanation of theory and instrumentation. Some of the grading will, by the nature of the reports, be subjective.

Your lab grade will be computed by averaging the report grades and an evaluation of your performance in lab (participation, handling of equipment, clean-up, safety procedures).

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