

CHEMISTRY 1211K LABORATORY SYLLABUS

Fall 2019 CRN# 80097 / 93779 (HONORS)

Tuesdays 1:00pm – 4:00pm, Natural Science Center Rm 218/234/238 *Dr. Ray (gbray@gsu.edu)*

Instructor: **Dr. Gigi B. Ray**

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Office: 212 Courtland North

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(Send emails from your GSU email account and write Chem1211 Lab on the subject line)

Office Hours: Mondays 4:00pm – 5:00pm and Fridays 9:30am – 10:30am, or by appointment.

Lab Meetings: 1:00pm – 4:00pm every Tuesday, Sept 3, 2019 to Dec 3, 2019

Pre-Lab Lecture: Tuesdays 1:00 pm – 1:45 pm, NSC 218, and

Lab (immediately after prelab): Tuesdays 1:45 pm – 4:00 pm, NSC 234/238

Teaching Assistants: Andrew Brown, Adefioye Adenipekun, Swetha Pasumarti

Text/ Lab Manual: The Identification of an Organic Acid (distributed first day of lab)

Laboratory Materials Required: A stitched and bound notebook, and safety goggles or glasses. Bring these items to EVERY lab meeting, including the first lab meeting on September 3rd. Goggles can be purchased in lab on the first day. Lab fees paid to the university cover the laboratory manual and expendable supplies used in the lab throughout the semester. Replacement cost for broken or lost glassware/chemicals are due at end of the semester.

Schedule of Activities and Grading: The schedule of the lab experiments (p.iii) and the grading scheme (p.14) are in the lab manual. Except for the first experiment on density, the rest of the lab activities are designed as an **INDIVIDUALIZED STUDENT PROJECT** that will continue throughout the semester and involve purification and identification of an unknown organic acid. Data will be recorded in ink **DIRECTLY** in student's lab notebook, and data report sheets will be submitted to the instructor on specified dates. Details are given in the lab manual (p. 10–13) and will be discussed during the pre-lab lectures.

Grading:

Final Exam	90 *	*Required to be complete before total points assigned.
Notebook	20 *	
Quizzes	30	
Density Data Sheet	20 *	
Final Report (quality)	60 *	
Identification of Unknown Acid	20 *	
Recrystallization & % Yield	40 *	
EW, NaOH & HCl calculations	70 *	
Computer Search & Analysis	10 *	
pKa Titrations & Sodium Fusion	30	
<u>Identification (Logic)</u>	<u>10</u>	
TOTAL (Maximum)	400 pts	(divide by 2 to obtain lab points for semester grade)

Overall Chem 1211K grade: lab component is worth 200 pts, and lecture component is worth 600 pts.

Examinations and Reports: There will be **several quizzes** during the semester, and a full length **comprehensive final examination** (on the last day of lab, December 3, 2019). A **report on the density of the unknown liquid lab**, and **data sheets** on **melting point of unknown solid acid**, standardization (**molarity**) of **aqueous NaOH** solution prepared by student, **molarity of aqueous HCl** provided to student, **equivalent weight of unknown solid acid**, **sodium fusion** results and a **computer search** will be submitted to the instructor on specified dates during the semester. Points (10% per day) will be deducted for late reports and data sheets.

To pass the lab, a **FORMAL COMPREHENSIVE FINAL REPORT** and the **LAB NOTEBOOK** will be submitted to the instructor at the end of the semester on **Dec 3, 2019**. Lab drawer checkout is required by this date or sooner to avoid an additional fee (including students who withdraw). The GSU withdraw date is Tuesday Oct 15th; students must withdraw from both lab and lecture at the same time.

Class Preparation and Attendance:

- *Students are expected to attend EVERY prelab lecture and lab session on Tuesdays 1pm-4pm, except Nov 26 (Thanksgiving Recess). If a student is absent from PreLab, the student will not be able to do experiments that day, with NO makeup lab.* Please arrive on time, **sign-in at start of pre-lab**, do not leave during the pre-lab lecture, and keep cell phones OFF. During pre-lab and lab, all electronic items (phones, iPods, tablets, etc.) must be off and put away in a book bag. Students who are repeatedly late or absent will have points deducted.
- *Students are individually responsible for the timely completion of all assignments (experiments and reports), absence being no excuse.*
- *All additional handouts will be posted on the Lecture Class iCollege page, in “Lab Info – Dr. Ray” folder. Students are responsible for printing & reading these ahead of time, reading the lab manual, writing preparatory notes, and bringing them to lab. Suggested reading assignments, homework, and lab notebook preparation will be given each day for the following meeting; all of these and DATA CALCULATIONS must be COMPLETED at HOME BEFORE attending the next lab.*
- Periodic **pop quizzes** will occur at the **start of pre-lab** to evaluate preparedness for the day’s experiments. Lab notebooks will be checked throughout the semester, at start of pre-lab for preparation, and at end of lab for experiment completion. **Do not assume that extra time will be allowed if you fall behind.** A **maximum of one excused absence** may be made up, after Oct. 15th with instructor’s written permission, and ONLY if room is available in another lab section.

To succeed in lab:

1. **Come prepared** each day by reading the next assigned experiment and completing experiment title, objective, and procedure in your notebook before you come.
2. **Be self-reliant.** Pay attention in pre-lab and write down notes and calculations given on the board, so that you can refer to these while doing the experiments. **Socialize outside of lab.**
3. **Be efficient** in lab so that you can complete hands-on experiments in a timely manner. **Record all data, pre-lab notes, calculations DIRECTLY in your lab notebook in INK;** do not record data on random pieces of paper that can be easily lost or discarded.
4. At the end of each lab session, in your notebook jot down **where you stopped** and where you **need to start next time**. At the end of each experiment, record your **conclusion** (example: have pure crystals, melting point of acid is ___ °C, average molarity of NaOH is ___ M, equivalent weight of acid is g/mol, pKa of unknown acid is ___).
5. During lab, learn how to do the calculations. **Finish ALL calculations at home (lab homework) on data collected in lab, and bring them completed (in your lab notebook) to the next lab meeting.**
6. It is in your best interest to **complete experiments and submit data sheets on due date**, so that you can receive feedback on your progress and keep up with the experiment. Points will be deducted for late data sheets.
7. **Prepare for quizzes**, which focus on calculations needed for experiment analysis, and concepts.
8. **Start writing your final lab report before the end of the semester**, so that there is time for feedback.
9. Keeping a complete, **well organized notebook** will make the task of writing a good final lab report much easier.
10. Chemistry lab policies are at: http://chemistry.gsu.edu/files/2014/04/Laboratory_Requirements1.pdf

Chemistry Department Student Integrity Policy:

The Department of Chemistry follows the university policy on academic honesty published in "Faculty Affairs Handbook" and "On Campus: The Undergraduate Co-Curricular Affairs Handbook." All tests & quizzes taken & reports submitted must represent student's individual unaided effort. To receive or offer information during an examination will be considered cheating. Suspected offenses may be referred to the Department Chair for appropriate action.

Classes will never be cancelled unless an official from the Chemistry Department gives the class personal notification. Don't assume a note to be enough without checking with the Department office (389 Petit Science Center).

The University requires that faculty members must, on a date after the mid-point of the course (Oct 15, 2019) to be set by the Provost (or his designee):

1. Give a WF to all those students who are on their rolls but no longer taking the class
2. Report the last day the student attended or turned in an assignment.

Students who are withdrawn may petition Department Chair for reinstatement into their classes.

TENTATIVE SCHEDULE OF EXPERIMENTS FOR CHEMISTRY 1211 LAB

Fall Semester 2019

CRN# 80097 / 93779 (HONORS)

Tuesdays 1:00pm – 4:00pm, Natural Science Center Rm 218/234/238

Dr. Ray (gbray@gsu.edu)

DATE	LAB	CHEM 1211 LAB EXPERIMENTS
Sep 3	1	Check-in , Safety Video & Orientation, Desk & Unknowns assigned. Review safety procedures and equipment use. Wash all glassware in drawer. Review Buret use.
Sep 10	2	(1) Density of “Unknown Liquid Sample” 3 parts to experiment, discuss error analysis, take safety test. (<i>Read Lab Manual p.19–21, p. 55–64</i>)
Sep 17	3	(2) Purify “Recrystallization Unknown”, Determine % Yield (<i>Read p.22–30 top</i>) – <i>Submit “Density” Data Sheet (p. 81 – 83)</i>
Sep 24	4	Start Semester-Long Project – (<i>Overview p.30</i>)
		(3.1) Determine Melting Point of Unknown Acid: (<i>p.31–33, p.65–66</i>) Record unknown number, save & use this “Unknown Organic Acid” for rest of the semester
		(3.2) Determine Solubility of Unknown Carboxylic Acid (<i>p.33</i>) – <i>Submit “Recrystallization Experiment” Data Sheet (p. 84)</i>
Oct 1	5	(3.3) (i) Prepare NaOH solution. (<i>p. 35</i>) <i>See handout in iCollege</i> (3.3) (iii) Titrate NaOH solution with KHP to determine exact NaOH molarity. Save & use this NaOH solution judiciously for rest of the semester. (<i>p.36–38</i>) – <i>Submit “Melting Point” Data Sheet (p. 85)</i>
Oct 8	6	(3.3) (ii) Titrate approximately 0.3M HCl solution (record Carboy No.) with standardized NaOH to determine exact molarity of HCl. (<i>p.35–36</i>) – <i>Complete “Molarity of NaOH Calculation” Data Sheet (p. 86 top)</i>
Oct 15	7	(3.3) (iv) Titrate RCO₂H with NaOH to determine RCO ₂ H Equivalent Weight (<i>p.38- 40</i>) – <i>Submit “Molarity of NaOH & HCl” Data Sheet (p. 86)</i>
Oct 15	Tues	Last day to Withdraw (must drop BOTH lab & lecture at same time)
Oct 22	8	(3.4) Perform Computer Search to find possible Identity of RCO ₂ H. (<i>p.41–43</i>) (3.5) Begin pKa titrations of RCO₂H with NaOH using pH meter (<i>p.67–68</i>). <i>See handout in iCollege</i> – <i>Submit “Equivalent Weight” Data Sheet (p. 87)</i>
Oct 29	9	(3.5) (steps 1–7) Do full pKa titration of RCO₂H with pH meter. (<i>p.44–47</i>) (step 8) At HOME Graph Titration Curve using Excel (<i>p. 48–50, p. 69–71</i>) Bring plots (printout) to next Lab. <i>See handout in iCollege</i> (3.6) Submit copy of computer search for Sodium Fusion Tests to identify N, Cl, Br, I (<i>p.51</i>) – <i>Submit copy of Computer Search to Instructor & keep a copy for your report.</i>
Nov 5	10	(3.5) Do 2nd and 3rd pKa titrations of RCO₂H with NaOH using pH meter with acid dissolved in 3 different % EtOH solutions. (<i>p.49 bottom – 50</i>) (3.6) Obtain Sodium Fusion Test results to identify presence of N, Cl, Br, I. – <i>Submit one pKa Titration Curve</i> – with equivalence point and pKa identified. (<i>p.48, 71</i>)
Nov 12	11	(3.5) Finish pKa titrations of RCO₂H with NaOH with pH meter at 3 different % EtOH – Determine pKa value in pure H ₂ O from pKa titration graphs & %EtOH correction plot (<i>p. 50</i>) – Calculate Equivalent Weight from pKa titration graphs. <i>See handout in iCollege</i>
Nov 19	12	Make-up Lab, Finish all experiments, Clean-up and Checkout. Pharmaceutical computer activity for Honors and interested students.
Dec 3	13	Take Final Exam, Submit Lab Notebook & Final Lab Report** **Required to Pass Lab (include Computer Search & summary data sheet) Clean-up and Checkout.