

Chem 1212K Lab  
Fall 2014  
CRN 81418

PreLab Lecture: Fridays 11:00am – 11:45am, 362 Petit Science Center

Laboratory: Fridays 11:45am – 2:00pm, 355 Petit Science Center (starts immediately after prelab)

**Instructor:** Dr. Gigi Ray  
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(404) 413-5540  
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When sending emails, please use your official GSU email account and put “Chem 1212 Lab” in the subject line

**Teaching Assistants:** Carrie Daniels, Patrick Major, Shanshan Tan

**Office Hours:** Mon 1:00 pm - 3:00 pm and Wed: 10:30 am - 12:30 pm

**Text:** GSU Lab manual (to be handed out at first lab lecture; cost included in lab fees).

A course outline, schedule of activities (p.7-9), grading (p.6) is included in the lab manual.

**Learning Outcomes:**

Course will focus on reinforcing concepts and stoichiometric calculations from Chem 1211 and 1212 lectures. The students will synthesize a compound containing Cobalt,  $\text{NH}_3$  and halide ( $\text{Cl}^-$  or  $\text{Br}^-$ ). Then they will do QUANTITATIVE ANALYSIS to determine some properties of this compound, and will determine the formula of the synthesized product. This will involve precipitation reactions, acid-base titrations, redox titrations, and doing stoichiometric calculations to find the mass % of each element in the compound. Students will also learn how to prepare solutions of known concentration, and the proper handling and disposal of acids, bases and other common chemicals.

**Lab Policies:**

1. This lab is an individualized project-oriented lab, which includes synthesizing a compound, analyzing its composition, calculating and reporting results, identifying the compound, and explaining how the data obtained leads to the selected identity of the compound. Students will work independently in lab and report their own results.
2. Lab notebooks should be kept up to date. **Stitched, bound notebook required.** Leave 3 blank pages at front of notebook for Table of Contents. ***All pages must be numbered and dated at top right. All data must be recorded in ink.*** Do not tear out pages, or whiteout/markout data. Instead present corrected data on another blank page. ***Notebooks must be signed by TA's or lab instructor when requested at beginning or end of lab.***
3. Quizzes will be given at the START of prelab, and will be closed book. No makeup quizzes given.
4. Take ALL notes in lab notebook during prelab lecture, including calculations done on board.
5. Before lab each week, students are responsible for READING and WRITING in their lab notebooks about procedure for each new experiment in advance of lab (see schedule at end). CALCULATIONS on student's data needs to be done at HOME IN NOTEBOOK, before next lab meeting.

**A summary in your own words about the experiment including (i) purpose, (ii) materials, (iii) experimental methods (bullet points) must be written in your notebook before beginning an experiment. TAs will check notebooks before entering lab & students without written notes in their notebook, will NOT be allowed to enter the lab.** During lab students are expected to record date in INK, DIRECTLY into the NOTEBOOK, not on other papers & later transferred to notebook.

6. **Safety glasses or goggles required to be worn at all times inside the lab.**

7. Dress appropriately. Students will not be allowed to enter the lab without appropriate clothing.
  - (i) No open-toed shoes (flip-flops, sandals, crocks, etc.)
  - (ii) No shorts or short skirts. Legs must be covered, no ankles showing.
  - (iii) No sleeveless shirts/tops. Shoulders must be covered. Long sleeves advised. Use lab aprons.
8. **The preparation/handling of concentrated acid or ammonia solutions must be carried out under the hood. All experiments (except titrations) must be done in the hood.** Students must handle all chemicals safely and dispose of them in appropriate waste containers.
9. **Cleaning up is part of the lab session. Students should stop working and begin cleaning up their work area, including their hood space, 20 minutes before the conclusion of the lab session.** Return all checked out items to TA at least 10 minutes before the end of lab (by 12:50pm). **Students must exit the lab by 1:00pm.** Points will be deducted if work area is left messy. Students need to put away all individual glassware & supplies in their locked drawer before leaving lab. Items left out on counters will be taken up and students will be charged for missing items at end of the semester.
10. **No food or drink allowed in the lab.** This includes chewing gum and candy. Put all food/drink away inside your book bag. Bags, coats, umbrellas, etc are to be stored in the compartments by the door; these items are not allowed on the floors, stools or lab counters. **Failure to follow safety rules will result in expulsion from the lab with no make-up allowed.**
11. **Students must turn in completed data sheets (in ink) with all calculations shown at the completion of each experiment** (p.71-83 of the lab manual, due dates below). Calculations with correct significant figures and units must be included for full points. Points will be deducted for late submissions, which are only allowed up to one week after the due date. Graded data sheets will NOT be returned to students (so keep a copy for yourself in your notebook), and late data sheets will not be accepted at the end of the semester. Typed final **data tables** and **sample calculations** must be included in the final lab report, including p. 67 (summary data sheet).
12. **No make-up labs allowed until after the semester mid-point on October 14, 2014.** Each student may only have one make-up lab session. Written authorization from lab instructor is needed before making up a lab. Students will only be admitted to make-up labs if the instructor determines that there is room in the lab that day.

**To pass the lab:** students MUST (1) **take the written lab final exam**, (2) **turn in a final lab report**, and (3) **turn in their lab notebook**. All items are due **at the beginning of pre-lab on Dec. 5, 2014** (during week 13). It is important that students work on their lab report as experiments progress during the semester. Grading scheme is given on p. 6 of lab manual. Directions on writing a lab report are given on p. 61 – 65 of lab manual. Note, the final lab report cannot be written in one night.

**First Session:** Safety, check-in, crucibles weight experiment (pages 69 & 71 of the lab manual) Students can use page 69 of the lab manual as a model on how to write lab notebook. Every experiment needs to be dated (at top right of page). A similar format should be used for the rest of the experiments to be performed during the semester.

**Sessions 2 through 12:** Preparation and determination of the formula for a cobalt-amino-halide complex, and determination of unknown concentrations and mass percentages.

**Session 13** Final exam and check out. Lab notebook and final report (including the summary table on page 67 of the lab manual) are due Dec. 5, 2014 at start of prelab. Graded lab notebooks may be picked up from the lab instructor in the first week of the following semester, after which time they will be discarded. Graded final exams and final reports can be viewed in the instructor's office but will not be returned to the students. **No grades will be given via e-mail or by phone.**

## TENTATIVE SCHEDULE OF EXPERIMENTS

Fall 2014  
CRN 81418

Fridays 11:00 am – 2:00 pm, 362 & 355 Petit Science Center

Dr. Ray (gbray@gsu.edu)

DATE	WEEK	CHEM 1212 LAB EXPERIMENTS
Sep 5	W1	<b>Check-in</b> , Safety Video, Desks & Synthesis assigned. Review safety procedures and equipment use. <b>Obtain constant weight of 2 Gooch crucibles</b> (weigh on analytical balance, heat 30mins in oven, cool overnight in desiccator), do not touch with bare hands. Record Balance number. Review Buret & Analytical Balance use.
Sep 12	W2	<b>Start Synthesis of Co-aquo-NH<sub>3</sub>-halide (Cl<sup>-</sup> or Br<sup>-</sup>)</b> (assigned by instructor). Also reweigh crucible, heat, then cool in desiccator. Want constant weight (2 measurements) within +/- 0.0005 grams.
Sep 19	W3	<b>Complete Synthesis of Co-aquo-NH<sub>3</sub>-halide (Cl<sup>-</sup> or Br<sup>-</sup>)</b> . Also reweigh crucible, heat, cool & reweigh. Want constant weight +/- 0.0005 grams.
Sep 26	W4	<b>Precipitation of Halide</b> . Determination of %Cl <sup>-</sup> or %Br <sup>-</sup> in synthesized compound. - <i>Submit % yield &amp; product color of synthesized compound.</i>
Oct 3	W5	Complete <b>second precipitation</b> of Chloride or Bromide and calculate % halide. - <i>Submit "Crucible Weight" Data Sheet (p. 71).</i>
Oct 10	W6	<b>Prepare ~0.3M HCl solution. Titrate</b> with primary standard THAM to <b>standardize HCl</b> . - <i>Submit "Preliminary %Halide" Data Sheet (p. 73).</i>
Oct 14		Last day to withdraw (from BOTH lab and lecture)
Oct 17	W7	<b>Distillation of NH<sub>3</sub></b> into boric acid solution in the hood and titration of NH <sub>3</sub> with standardized HCl. (BOTH the distillation and the acid-base titration must be carried out in SAME lab session). Calculate %NH <sub>3</sub> in synthesized compound. - <i>Submit "Preliminary HCl Molarity" Data Sheet (p. 75).</i>
Oct 24	W8	Continue <b>distillation and titration of NH<sub>3</sub></b> two more times. <b>Determine %NH<sub>3</sub></b> .
Oct 31	W9	<b>Preparation of Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub></b> and titration with KIO <sub>3</sub> to <b>standardize Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub></b> . - <i>Submit "Preliminary Report on %NH<sub>3</sub>" Data Sheet (p. 77).</i>
Nov 7	W10	<b>Redox titration</b> of synthesized compound <b>with Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub></b> to <b>determine % Co</b> . - <i>Submit "Preliminary Report on Standardization Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub>" Data Sheet (p. 79).</i>
Nov 14	W11	<b>Analysis of H<sub>2</sub>O<sub>2</sub></b> using Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> . - <i>Submit "Preliminary Report on %Co" Data Sheet (p. 81).</i>
Nov 21	W12	<b>Make-up Lab</b> , Complete all experiments. Clean-up and Checkout. - <i>Submit "Preliminary Report on %H<sub>2</sub>O<sub>2</sub>" Data Sheet (p. 83).</i>
Nov 24	- 28	Thanksgiving Holiday
Dec 5	W13	<b>Take Final Exam, Submit Lab Notebook and Final Lab Report</b> (including summary data sheet p. 67 ). Clean-up & Checkout.

**TENTATIVE SCHEDULE OF EXPERIMENTS**  
Chemistry 1212 Lab      Fall 2014      CRN 81418

Lab on Fridays 11:00 am – 2:00 pm, 362 & 355 Petit Science Center      Dr. Ray (gbray@gsu.edu)

I have read the entire syllabus and understand the grading system and agree to abide by the course policies and all the additional information provided in it, including the following:

1. **No make-up tests or quizzes** will be given.
2. Students need to show their GSU Panther I.D. card when taking exams and quizzes.
3. The instructor reserves the right to assign seating during exams and quizzes.
4. Cell-phone calculators and programmable calculators are not allowed.
5. Cell-phones need to be kept either in purses or book-bags during exams or quizzes, and should be turned off at all times.
6. **The preparation/handling of concentrated acid or ammonia solutions must be carried out under the hood.** Unused concentrated acid or ammonia solutions must be diluted by adding them to water, under the hood. The amount of water to be used in the dilution depends on the amount of reagent needed to be diluted so it will not fume (about 1 in10 dilution). The diluted solutions will be discarded in the waste drum located in the lab. Glassware used for the preparation/handling of concentrated acid or ammonia solutions must be rinsed with enough water, under the hood, and the combined rinses must then be placed in the waste drum.
7. **Failure to come prepared to lab (with purpose, procedure and blank data tables)** will result in the student sitting outside the lab, and writing this material in the notebook before being allowed to enter the lab. Failure to follow safety procedures will result in expulsion from the lab, with no opportunity to do makeup labs and with a loss of credit.
8. **Preliminary reports on all calculations, in ink, must be submitted at the time of the completion of each experiment** (due dates in syllabus), and a typed version must be included in the appendix section of the final report; otherwise, you will be assigned the minimum amount of points for those experiments not submitted (if you have supporting data in your lab notebook). Preliminary report forms are found in the last pages of the lab manual, one for each experiment needing calculations. **For full points show sample calculations with correct significant figures and units.**
9. **The clock schedule for the lab must be followed.** Students are not to enter occupied labs before the scheduled start time of the lab itself. *For each scheduled lab section, clean-up must be completed by the end time of the lab (2 pm) so as not to disrupt the next class.*
10. **Make-up lab policies are posted** on the door outside the lab, and will only be allowed after October 14, 2014 if space available. A written authorization from your lab instructor is required.

Name (print in ink): \_\_\_\_\_

Signature (in ink): \_\_\_\_\_

Date: \_\_\_\_\_