

Chem 1212K Lab  
Spring 2019  
CRN 51719

PreLab Lecture: Thursday 12.00 Noon **327 Classroom South (pre lab lecture)**

Laboratory: Thursday 12.45 PM **237 Classroom South (starts immediately after prelab)**

**Instructor:** Dr. Jyotsna Thota  
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**Office Hours:** T 11.30 AM – 1.30 PM

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

**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 every lab session.***
3. Quizzes will be given at the START of prelab, and will be closed book. No makeup quizzes given.
4. Take DETAILED 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 notebook about procedures for each new experiment in advance of lab (see schedule at end). CALCULATIONS on student's data need to be done AT HOME IN THE 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. This should be done at home before the prelab lecture. TAs will check notebooks before pre lab lecture. Students without written summary in their notebook will NOT be allowed to attend pre lab lecture and lab.** During lab students are expected to record data 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 (wear socks)
  - (iii) No sleeveless shirts/tops. Shoulders must be covered. Long sleeves advised. Use lab aprons.
8. **Students must turn in completed data sheets (in ink) with all calculations shown at the completion of each experiment** (due dates below). **Points deducted for late data sheets, which will NOT be accepted after the second meeting following completion of an experiment.** 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 summary data sheet. Preliminary report forms are found in the last pages of the lab manual, one for each experiment needing calculations.
  9. **Calculations with correct significant figures and units must be included for full points on data sheets and final lab report. Complete all calculations on previous day's lab, before coming to next lab. Use lab time efficiently to complete experiments, not to finish previous calculations.**
  10. **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 15 minutes before the end of lab (by 2:45pm). **Students must exit the lab by 3.00 pm.** 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.
  11. **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.**
  12. **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.
  13. **No make-up labs allowed until after the semester mid-point on March 5<sup>th</sup>.** 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 Tuesday July 17, 2018** (during lab #12). It is important that students work on their lab report as experiments progress during the semester. Grading scheme is given in the 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 11:** Preparation and determination of the formula for a cobalt-amino-halide complex, and determination of unknown concentrations and mass percentages.

**Session 12** Final exam and lab check out. Lab notebook and final report (including the summary table on page 67 of the lab manual) are due Tuesday July 17<sup>th</sup> at start of prelab. Graded final exams, final reports, and lab notebooks can be viewed in the instructor's office in the first two weeks of the following semester, but will not be returned to the students. **No grades will be given via e-mail or by phone.**

## TENTATIVE SCHEDULE OF EXPERIMENTS

DATE	Session	CHEM 1212 LAB EXPERIMENTS
Jan 24	1	<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.
Jan 31	2 Safety quiz	<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.
Feb 7	3	<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 g.
Feb 14	4 Quiz 1	<b>Precipitation of Halide</b> . Determination of %Cl <sup>-</sup> or %Br <sup>-</sup> in synthesized compound. <b>- Submit % yield &amp; product color of synthesized compound.</b>
Feb 21	5 Quiz 2	<b>Prepare ~0.3M HCl solution. Titrate</b> with primary standard THAM to <b>standardize HCl</b> . Complete Halide Experiment.
Feb 28	6 Quiz 3	<b>Distillation of NH<sub>3</sub></b> into boric acid solution in the hood then 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. <b>- Submit "Preliminary %Halide" and "Crucible Weight" Data Sheets (p.71 &amp; 73). Show full calculations with correct significant figures.</b>
Mar 7	7 Quiz 4	Continue <b>distillation and titration of NH<sub>3</sub></b> 2 more times. <b>Determine %NH<sub>3</sub></b> <b>- Submit "Preliminary HCl Molarity" Data Sheet</b>
Mar 14	8 Quiz 5	<b>Spectrophotometric determination of % Co.</b> <b>ChemDraw Computer Activity: Acid-Base Reaction Mechanisms</b> <b>- Submit "Preliminary Report on %NH<sub>3</sub>" Data Sheet</b>
Mar 28	9 Quiz 6	<b>Preparation and standardization of Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub></b> . Prepare Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> and titrate with KIO <sub>3</sub> to use for Redox Titration for Analysis of H <sub>2</sub> O <sub>2</sub> using Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> . <b>- Submit "Preliminary Report on %Co" Data Sheet</b>
Apr 4	10 Quiz 7	<b>Redox Titration for Analysis of H<sub>2</sub>O<sub>2</sub> using Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub></b> . Titrate H <sub>2</sub> O <sub>2</sub> with KIO <sub>3</sub> and standardized Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> to determine % H <sub>2</sub> O <sub>2</sub> . <b>- Submit "Preliminary Report on Standardization Na<sub>2</sub>S<sub>2</sub>O<sub>3</sub>" Data Sheet</b>
Apr 11	11	<b>Make-up Lab</b> , Complete all experiments. Clean-up and Checkout. <b>- Submit "Preliminary Report on %H<sub>2</sub>O<sub>2</sub>" Data Sheet</b>
Apr 18	12	<b>Make-up Lab</b> , Complete all experiments. Clean-up and Checkout. <b>- Submit "Preliminary Report on %H<sub>2</sub>O<sub>2</sub>" Data Sheet</b>
Apr 25	13	<b>Take Final Exam, Submit Lab Notebook and Final Lab Report (including summary data sheet p. 67).</b> <b>Clean-up &amp; Lab Checkout.</b>

## Chemistry 1212 Lab Agreement

**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. The instructor reserves the right to assign seating during exams and quizzes. Students need to show their GSU Panther I.D. card when taking exams and quizzes.
3. Cell-phone calculators and programmable calculators are not allowed. Cell-phones need to be kept either in purses or book-bags during exams or quizzes, and should be turned off at all times.
4. **Failure to follow safety procedures (including appropriate clothing & shoes)** will result in expulsion from the lab, with no opportunity to do makeup labs and with a loss of credit.
5. **Failure to come prepared to lab (with purpose, procedure, blank data tables in permanent lab notebook)** will result in the student sitting outside the lab, and writing this material in the notebook before being allowed to enter the lab.
6. **Preliminary reports on all calculations, in ink, must be submitted at the time of the completion of each experiment (due dates in syllabus). Points deducted for late data sheets, which will NOT be accepted after the second meeting following completion of an experiment.** A typed version of data tables 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.
7. **For full points show sample calculations with correct significant figures and units. Complete all calculations on previous day's lab, before coming to next lab. Use lab time efficiently to complete experiments, not to finish previous calculations.**
8. **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.
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 (1:25 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 Jun 29, 2018 if space available. A written authorization from your lab instructor is required.
11. 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.** These items are **due at the beginning of pre-lab on Tuesday July 17, 2018** (during lab #12). Note, the final lab report cannot be written in one night.

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

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