AUGUSTA UNIVERSITY

CHEM 1211 L
Principles of Chemistry I Laboratory
Fall 2017

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Lab Time and Location: Mondays;
Prelab at 2:30 pm in SCI E1051
Lab follows in SCI E3023 or E3025

Course Description

Chem 1211L is the companion laboratory course for Chem 1211. CHEM 1211L is an introduction to the laboratory environment and will focus on techniques and methods that will allow students to apply concepts learned in lecture to actual laboratory experiments.

Proper attire is required for admission into lab. Proper attire consists of:

1. Lab coats are required of **ALL** students in the lab when chemicals are set out or in use.
2. Clothes must cover from the shoulder to the ankles. There should be no skin visible on the leg, ankle, or foot. This is a minimum requirement for entry into the lab, regardless of whether or not chemicals are out.
3. Shoes must be closed-toe and cover the entire foot. This is a minimum requirement for entry into the lab, regardless of whether or not chemicals are out.
4. Safety glasses or goggles, approved by the instructor, must be worn whenever any person has chemicals in use.
5. Long hair should be confined.

Students are also expected to bring: Their laboratory notebook (prenumbered with duplicate pages), lab coat, safety glasses, pen and a scientific, nonprogrammable calculator. Recommended: TI-30X. Any graphing calculator will **NOT** be permitted in lab or on the final exam nor will calculators equivalent to these be permitted. (i.e., TI numbers 40 or higher are NOT permitted.). Students who do not bring these items will not be permitted to participate in lab.

Each experiment will have a prelab. The prelab will let you know the topic of the experiment and how to prepare. Completion of the prelab is also a requirement for admission to the lab. There will be a variety of prelabs. Some examples include: watching on-line videos, looking up information that will be used during the experiment that should be recorded in your notebook; practice calculations to complete. The prelab will be worth 10 points out of the 50 points for each lab and 5 points will be deducted for late pre-lab assignments. For video pre-labs, questions embedded in video will be worth 1 point each.

Most experiments will have a postlab. The postlab will be an additional worksheet handed out at the end of lab and the due date will be set by the instructor (usually to be completed within 24 hours). The post lab exercise will be worth 10 points out of the 50 points for each lab.

Attendance/Grading Policy: To receive credit for attending a lab, students must be on time for all pre-lab meetings and remain for the entire experiment. Arriving late to a pre-lab lecture is cause for dismissal from that day's lab. Lab partners/groups will be assigned at the discretion of the instructor. Any missed lab earns a zero grade and there are no make-up labs. A student can miss up to two labs in a semester, however a third missed lab will result in withdrawal from the course. A student may replace their lowest lab grade by attending the last experiment of the semester. For example, a student who has missed only one lab the entire semester, can exchange that zero for the grade they earn on the last week's experiment. A student who missed two labs, will have two zeroes, but only one of

those zeroes can be replaced by attending the last week's experiment. The topic of the last experiment will be on the final exam for the Chem 1211 lecture, so attendance is highly recommended even if no other labs have been missed throughout the semester. The lab final exam will count toward 20% of the final grade. The remaining 80% of the course grade will come from an average of the weekly lab grades.

Withdrawal Policy: CHEM 1211 is a co-requisite for this course. Unless you already have credit for CHEM 1211, you must be signed up for that course as well as this one. Normally, if you withdraw from one course, you must also withdraw from the other. Withdrawal from course and lab only counts as one withdrawal.

Other Safety Information:

Accidents and Spills

1. Know the location of laboratory fire extinguisher, eyewash, first aid kit, broken glass container and clean up materials for spills.
2. Report all accidents immediately to the instructor.
3. Report all significant spills immediately to the instructor.
   If you are in doubt as to whether it is significant, report it!
   If you got some of the chemical on yourself, report it!
4. If you get a chemical on yourself, wash if off immediately. Wash two more times after you think you have removed it all. It is recommended to wash your hands before leaving lab.
5. Clean all chemical spills properly and promptly.

General

1. Students may not perform unauthorized experiments or work in lab without supervision.
2. All equipment must be used properly and safely.
3. No food, chewing gum or drink (or even their containers) should be brought into lab.
4. No horseplay.
5. Cosmetics should not be applied in lab.
6. Clean up after yourself, leaving things as you found them or better.
7. Each chemical is labeled with a diamond indicating the hazards of working with the material. Just remember that higher numbers indicate more danger. If you want more information, ask the instructor.
8. Keep your notebook properly and remember that you will need sufficient detail from early experiments to refer back to later in the semester in order to be successful in later experiments.

Learning Outcomes – Students will:

- Employ high scientific standards in their laboratory notebook
- Use safe practices (when handling chemicals and equipment) in the laboratory
- Read and interpret appropriate safety information or instructions
- Demonstrate appropriate academic engagement (preparation for class, attendance, timeliness, etc.)
- Demonstrate metacognitive skills such as self-directed learning behaviors, personal growth as scientists, and strengths and weaknesses
- Demonstrate the ability to work effectively as part of a team
- Produce written work that clearly and concisely articulates scientific ideas and arguments
- Construct logical arguments based on the interpretation of scientific data
- Integrate mathematical skills (graphing, algebra, statistics, etc.) to problem solving
- Integrate mathematical skills (graphing, algebra, statistics, etc.) to data interpretation
- Operate chemical instruments and glassware properly
- Demonstrate knowledge of scientific software appropriate to a chemist

Lab Reports:

Details for how each experiment is conducted and how you should write your lab notebook follow. You might want to staple these into the first few pages of your notebook so that you can refer to them frequently. You will be given a handout with directions for the experiment and writing up the lab report. At the end of lab, you will turn in the duplicate pages of your lab notebook for grading. This will be both your lab notebook and your lab report. Even if it is not specifically in the handout, the following sections must always be included and should be labeled as shown below (also they should be in this order):

Title

You may use the title on the handout, however, "experiment 1" or similar title is not acceptable.

You must include your name and the name of your lab partner.

You should include the date of the experiment.

There are convenient spaces at the top of the lab notebook to fill this information in; but is not required that you use them.

Introduction

For most experiments, this will consist only of a purpose statement.

The statement should be a complete grammatically correct English sentence or two. Be as specific as possible.

The statement should express the experimental purpose, not expected learning outcomes (the teaching purpose). Make sure to address "the what" and "the how" for the experiment: What are you trying to prove/find?, and How are you going to do this? e.g., Right: The concentration of an unknown solution of nickel(II) sulfate will be determined. Wrong: We will learn how to make solutions and use a spectrometer.

Procedure

You will normally not be asked to write a procedure because it will be given in the handout. However, it is recommended that you attach the procedure in your notebook so that you know what you did. Any attached materials to be part of a notebook must be secure and permanent (i.e. staples, tape, or glue)

Results and Discussion

This is where you will put your collected data and analysis of that data.

Data must be entered directly into the notebook NOT on scrap paper.

Errors should be struck out, ~~like this~~, not erased or scribbled over so that they are illegible.

Collected data must have the appropriate significant figures and units.

Units and significant figures are determined by the measuring device used! Record all significant figures given by the measuring device.

Data is often collected into or directly written in a table. The criteria for titles is as follows:

Table Criteria:

Title:	At top of table
	Includes appropriate numbering (e.g., "Table 1. Absorbance of $NiSO_4$ Solutions)
	Trials in vertical dimension
Columns:	Heading includes units in parenthesis
	Heading is not the unit
	Columns consist of all data that changes and results of relevant calculations
Entries:	Use significant figures as determined by measuring device or calculation
	Units are in column heading not in entry
	If data is the same for each entry, do not include as column, but elsewhere in table

Table is on one page

Example:

Table 1. Speed and momentum of Object 5.

Mass of object 5 = 20.382 g

Trial	distance (cm)	time (s)	speed (cm/s)	momentum (g·cm/s)
1	5.00	10.0	0.500	10.2
2	25.21	51.2	0.492	10.0
3	40.72	79.1	0.515	10.5
4	63.55	129.3	0.4914	10.02

Data analysis will often consist of making a graph. The criteria for a correct graph is as follows:

Graph Criteria:

Use spacing effectively: The graph size should be more than ½ page.
Only show quadrants actually used or needed for context

Title: Includes appropriate numbering (e.g., Figure 1. Beer's Law for $NiSO_4$)
Labeled as "Figure" not "graph" or whatever
Does not repeat axes

Axes: The x-axis is used for the independent variable
The y-axis is used for the dependent variable
Do not include axes or axes sections where it is not used to graph data (or show context)
Labeled (label is not unit, but includes unit)
Include dimension (unit) in parenthesis
Have visible tick marks
Spacing between tick marks reasonable for reading
Normally 1, 2 or 5 divisions
Tick labels have correct significant figures (consistent decimal places)

Data points: Visible but not inappropriately large
Data points reflect actual data
All the data!
Include outliers on graph even if they were ignored when drawing trend line.
If more than one data set is on the same graph, use different marker styles

Trend: Show data trend using line or curve as appropriate
If more than one data set is used, use a different style line for each and include a legend.
Do NOT include a legend if only one data set is used.
If trend is linear, determine equation of the line

Example: see next page

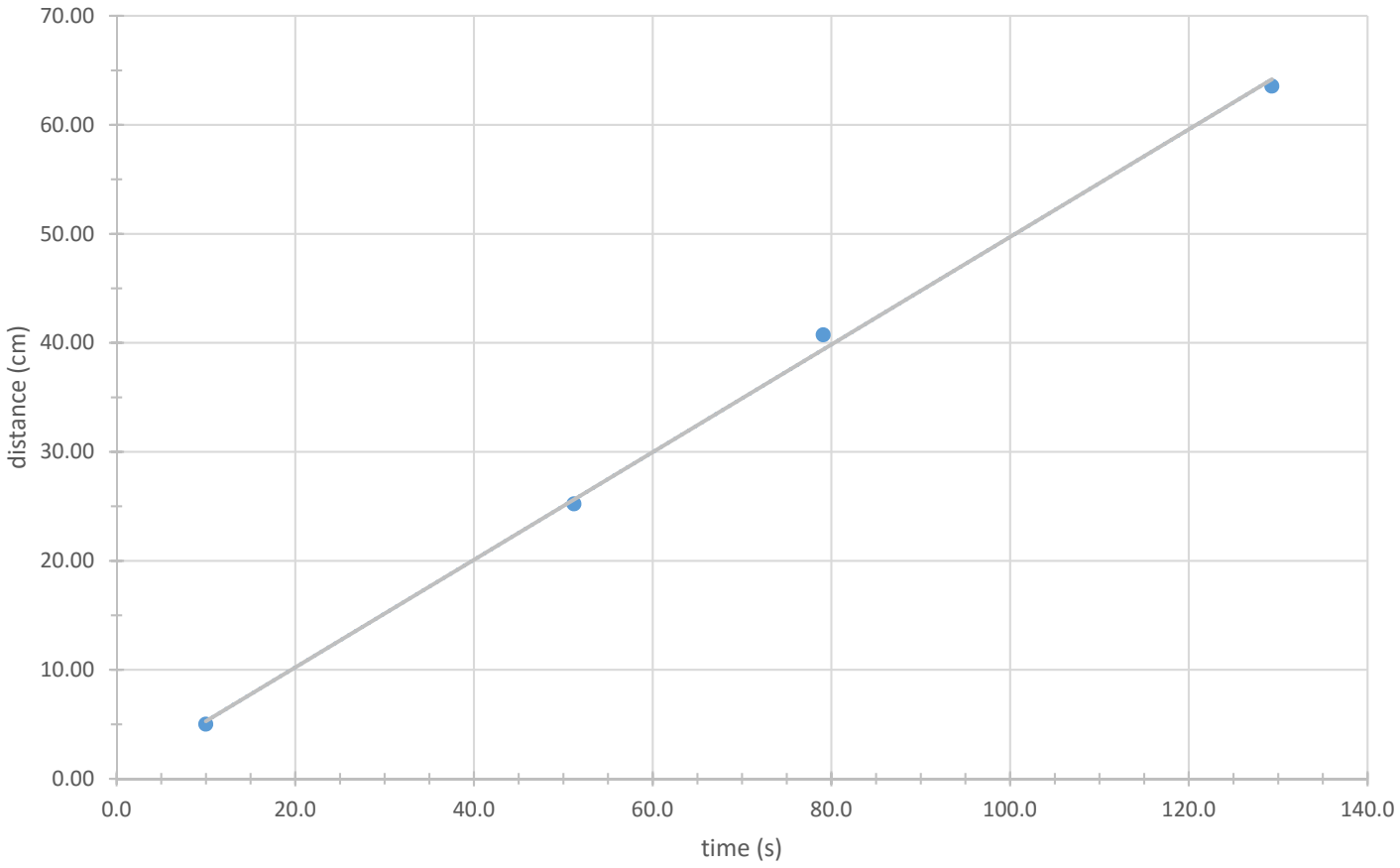

Figure 1. Speed of Object 5

Conclusions

These will be a series of guided questions. One question will always be about accomplishing your purpose as stated in the introduction. Other questions will generally address the quality of your results.

Format. Start with the question number. Answer in such a way that the reader does not have to know the question to understand the answer.

Example: 1. What is the concentration of your unknown solution?

1. The concentration of nickel (II) sulfate in unknown 4 was 0.123 M.