

Cedar Crest College

Chemical Equilibria & Analysis Laboratory

Chem 112
Spring 2008

Instructor: David Raker
Office: SC 124
e-mail: draker@cedarcrest.edu
Phone: (610) 606-4666 (ext. 3684) [office phone and voice mail]

Office Hours: Mon and Wed. 3:30 – 4:30 P.M.
Thurs. 4:15 – 5:00 P.M.

COURSE OBJECTIVES

- 1.To improve laboratory technique while demonstrating basic methods of quantitative analysis with emphasis on volumetric analysis.
- 2.To improve understanding of basic statistical methods for data evaluation through application to quantitative chemical analysis.

COURSE OUTCOMES

The students will demonstrate competence in laboratory skills involving basic quantitative chemical analysis while enhancing their ability to apply statistical methods for data evaluation.

MATERIALS REQUIRED FOR THIS COURSE

All of the following books and supplies are available in the campus bookstore.

Chemistry 112: Chemical Equilibria and Analysis Lab Manual, Dr. P. Kistler, Spring 2009 Edition.

Laboratory Notebook, W. H. Freeman and Company. You may continue to use the same notebook used for Chemistry 111.

Scientific hand calculator.
Eye protection - safety glasses or goggles.
Graph paper - 20 squares to the inch.

MEETING TIMES

All sections meet in SC 122

Laboratory:	Section 1	Tuesday	8:00 - 11:00 AM	Kistler
	Section 2	Tuesday	1:00 - 4:00 PM	Kistler
	Section 3	Thursday	8:00 - 11:00 AM	Kistler
	Section 4	Thursday	1:00 - 4:00 PM	Raker
	Section 5	Friday	1:00 - 4:00 PM	Sein
	Section 6	Monday	1:00 - 4:00 PM	Sein
	Section 71	Monday	7:00 - 10:00 PM	Raker

GRADING SYSTEM

This is a 1-credit laboratory course. It must be taken concurrently with the CHE 112 lecture course unless the student has already earned credit for the CHE 112 lecture with a grade of C- or higher. The student will receive a separate syllabus for the lecture portion of the course.

The grade for the laboratory portion of the course will be based on performance with respect to three items: the actual experiments, a final exam, and an evaluation by the instructor.

There will be 9 laboratory experiments. Each experiment will be graded separately, based on individual grades for pre-lab questions, report sheets (and graphs), and post-lab questions. The grades for each individual experiment will be averaged to produce a single grade for the experiments. This experiments grade will constitute 80% of the final laboratory grade.

Pre-lab questions **CANNOT** be submitted after the start of the laboratory experiment.

Laboratory reports are due at the *beginning* of the period. I will check to make sure all reports are turned in once the pre-lab lecture is finished. For any other laboratory material submitted after that time, a 10% penalty will be deducted from the grade for that experiment. A laboratory report will **NOT** be accepted late unless the carbon copy of your laboratory notes were submitted at the end of the period in which the experiment was completed. Lab reports will also **NOT** be accepted if they are more than 3 weeks late. In addition, no lab reports will be accepted after the student has taken the laboratory final exam.

Policy on returned labs

If there is a concern about a returned lab report, a specific procedure is used:

- 1.) Write your concern on the back of the lab report **AFTER** you have thoroughly looked over the lab report.
- 2.) Give the report to the instructor within 2 or 3 days of the return date.

The **ENTIRE** lab will be re-graded (at the instructor's convenience), with the possibility of the revised grade being lower than the original. Never change answers on a lab report. Random copies of lab reports may be made before they are returned.

A comprehensive laboratory final exam will constitute 15% of the final laboratory grade.

The remaining 5% of the final laboratory grade will be assigned by your laboratory instructor based on the student's performance with respect to such attributes as:

- Compliance with laboratory safety rules.
- Competence with respect to laboratory techniques.
- Organization and efficiency when performing experiments.
- General attitude in the laboratory and the degree of cooperation and contribution when performing experiments with a partner.

In summary, the laboratory grade will be computed as follows:

$$0.80(\text{Experiments Average}) + 0.15(\text{Lab Exam}) + \text{Instructor Evaluation}[0 - 5\%]$$

The following grading system is strictly adhered to and only very rarely is an exception made. There is **no** extra credit.

100-94%	A	82-80%	B-	69-65%	D+
93-90%	A-	79-77%	C+	64-60%	D
89-87%	B+	76-73%	C	59-0%	F
86-83%	B	72-70%	C-		

POLICIES

Attendance

Attendance in the laboratory is MANDATORY. All 9 experiments must be completed as scheduled and reports submitted when due. If, due to circumstances beyond your control, you are unable to do an experiment at your scheduled time, it may be possible to perform the experiment during some other scheduled laboratory period, preferably while another lab section is carrying out the same experiment. ***The missed experiment must be made up within two weeks of the missed period.*** The student should understand that making up missed experiments causes some difficulties, since you may not work in the laboratory alone. Therefore, when a student has missed an experiment, the make-up period must be scheduled in cooperation with the instructor. The laboratory section may be filled on the day and time you wish to make up the experiment.

When you miss an experiment, it is my policy that you obtain a valid written excuse from:

- 1.) a doctor or school nurse in case of illness.
- 2.) the Dean of Students' Office in the case of a family emergency.

In addition, you ***MAY NOT*** just appear unscheduled for a lab period (making up a lab or otherwise). If you chose to switch lab sections, you must obtain a drop/add form from the Registrar and ***officially*** change sections.

You should also make an effort to arrive on time for your lab period. The lab door will be closed and locked 5 minutes after the period starts if everyone is not present so pre-lab lecture can begin. If you arrive late, you will have to wait outside the lab until I am finished and the door is opened. It is essential that you be present for the entire pre-lab lecture. In addition, you must have sufficient

time to complete the experiment. For all late arrivals, I will decide if the student may begin the experiment at that time.

Obtaining Assistance

Obtaining Assistance

In addition to myself, the Instructional Assistants for this course are:
Kassie Woodard, Andrea Eberhardt, Christina Matika, and Jennifer Bonetti
Their hours of availability will be posted once their schedules are finalized.

DO NOT HESITATE TO SEEK ASSISTANCE OR ADVICE WHEN YOU NEED IT!

Honor Philosophy

"The Cedar Crest College Honor Philosophy states that students should uphold community standards for academic and social behavior in order to preserve a learning environment dedicated to personal and academic excellence. Upholding community standards is a matter of personal integrity and honor. Individuals who accept the honor of membership in the Cedar Crest College community of scholars pledge to accept responsibility for their actions in all academic and social situations and for the effect their actions may have on other members of the College community."

The instructor expects each student to abide by the college's honor code. This honor code applies to all activities associated with this course. The student should realize that the honor code is an important aspect of the educational process at Cedar Crest College.

The following statement concerning Classroom Protocol is supported by Cedar Crest College Faculty and Administration:

"Appropriate classroom behavior is implicit in the Cedar Crest College Honor Code. Such behavior is defined and guided by complete protection for the rights of all students and faculty to a courteous, respectful classroom environment. That environment is free from distractions such as late arrivals, early departures, inappropriate conversations, and any other behaviors that might disrupt instruction and/or compromise students' access to their Cedar Crest College education."

Turn off all cell phones and pagers during the laboratory period.

Community Standards for Academic Conduct:

"Academic integrity and ethics remain steadfast, withstanding technological change. Cedar Crest College academic standards therefore apply to all academic work, including, but not limited to, handwritten or computer-generated documents, video or audio recordings, and telecommunications.

As a student at Cedar Crest College, each student shall:

- Only submit work which is his/her own.

- Adhere to the rules of acknowledging outside sources, as defined by the instructor, never plagiarizing or misrepresenting intellectual property.
- Neither seek nor receive aid from another student, converse with one another when inappropriate, nor use materials not authorized by the instructor.

- Follow the instructions of the professor in any academic situation or environment, including taking of examinations, laboratory procedures, the preparation of papers, properly and respectfully using College facilities and resources, including library and computing resources to ensure that these resources may be effectively shared by all members of the College community.

- Abide by the Cedar Crest Computer Use Policy.

- If a student perceives a violation of the Academic Standards, he/she will go to their instructor.

- If you are unable to resolve the problem with the instructor, you should go to the chair of the department. If you need further assistance after consultation with the instructor and the chair, you should see the Provost."

It is the instructor's policy to deal with violations of these Standards for Academic Conduct by awarding a grade of 0 for the assignment or examination in question.

Students with Learning Disabilities

The instructor supports the Cedar Crest College policy regarding learning disabilities as follows:

"Students with documented disabilities who may need academic accommodations should discuss these needs with their professors during the first two weeks of class. Students with disabilities who wish to request accommodations should contact the Advising Center."

Requirement for Enrolling in Chemistry 205

Completion of the CHE 112 laboratory course with a grade of D or higher is required for enrollment in CHE 205. To be accepted into the Forensic Science Concentration, a student must earn at least a C in Chemistry 112 laboratory.

Additional Safety Rules:

- 1.) Broken glass is disposed of in the "broken glass" container, **NOT** the waste bucket! Do not

handle broken glass with your bare hands; use a dustpan and brush.

- 2.) Do not return chemicals to their original containers. This avoids contamination.
- 3.) Know the locations of the eyewashes, safety showers, fire extinguishers, fire blankets and 1st aid kits.
 - a.) Burning of the eyes should be treated by flushing with copious amounts of water for at least 15 minutes. It is necessary to hold open the eyelids during the flushing process.
 - b.) If there is an extensive chemical spill on a person, use the safety shower. Remove all contaminated clothing. There is no room for embarrassment in emergency situations. It could be the difference between life and death.
- 4.) Never leave a reaction or glassware setup unattended.
- 5.) Never pipet any liquids by mouth. Use a pipet bulb instead.
- 6.) Do not use the sink to discard filter paper or insoluble solids.
- 7.) Never point the open end of a test tube being heated at yourself or others.
- 8.) Never place a hot object on a balance or on a paper towel. Hot glass looks like cold glass. Place your hand 1 – 2 inches away from the object to feel if heat is coming off.
- 9.) Individuals (including children), who are not enrolled in the course, are prohibited from entering the laboratory.
- 10.) No student is allowed in the stockroom unless told to do so by an instructor.
- 11.) Place all book bags, coats, etc. in the designated area(s). These objects are trip hazards!

Misc.

- 1.) Carbon copies of lab data, etc. are to be turned in at the end of EVERY lab period (originals written in pen) unless otherwise instructed or 5 points will be deducted from that particular lab grade. Obtain the instructor's signature in the notebook before turning in the carbon copy. I must have the carbon copy, EVEN IF IT IS LATE. Points will be deducted for late carbon copies **with or without** the instructor's signature.
- 2.) All report sheets are to be written in non-erasable **PEN**. Five points will be deducted for any report sheets that are written in pencil, "Xerox" copies of pencil, or where white-out is used. Also, do not have multiple cross-outs on the report sheet (otherwise, points will be deducted). Acquire an extra blank copy from the instructor, etc.
- 3.) When completing pre- and post-lab questions:
 - a.) Briefly restate the question being asked in your answer. Assume the reader does

not have the question in front of them. Do **NOT** use non-descriptive words, phase, etc. such as:

it
is when
they
is because
the stuff, the substance, etc.
another material
the numbers are off
step # or equation # (show the equation!)
I read the color wrong
It was experimental/human error (such as?)
the solution was used to tell the meter (solutions cannot talk)...

unless you have mentioned what you are talking about in a previous sentence. In other words, "It reacted with the acid," does not tell the reader anything.

b.) Write neatly and with complete English sentences, grammar and spelling. If I cannot read your work or there are numerous grammatical errors, etc., I will mark it wrong!

c.) Show your work for any questions requiring calculations (and equations as needed). Include **UNITS** and watch your significant figures (sig figs).

4.) Pay attention and write down whatever is written on the chalkboards or overheads. This information is useful to you for completing the experiment or report sheets. The information may appear on the final exam as well.

5.) When performing calculations, double-check your answers to see if they make sense ("the giggle test"). Negative volumes and masses, high values for molecular weights (1000's or millions of grams/mole), extreme percent yields (10^{-5} or 175%), etc. should be red flags that a calculation error occurred!

CHRONOLOGICAL PLAN FOR THE COURSE

The schedule on the following pages list the dates each experiment will be performed for this course.

Laboratory Experiments Schedule

<u>2009 Date</u>	<u>Laboratory</u>
1/19, 1/20, 1/22, or 1/23	Introduction: safety regulations, procedures, and statistics review. Check-in
	Experiment # 1 (start)
1/26, 1/27, 1/29, or 1/30	Experiment #1: Volumetric Methods (finish)
2/2, 2/3, 2/5, or 2/6	Experiment #2: Preparation of a Standard Sodium Hydroxide Solution and Titration of Hydrochloric Acid
2/9, 2/10, 2/12, or 2/13	Experiment #3: Sampling and Analysis of a Drain Cleaner By Titration With Hydrochloric Acid
2/16, 2/17, 2/19, or 2/20	Experiment #4: LeChatelier's Principle
2/23, 2/24, 2/26, or 2/27	Experiment #5: Part I: Potentiometric Determination of Neutralization Curves
3/2, 3/3, 3/5, or 3/6	Experiment #5: Part II: Potentiometric Detremination of Acid in a Soft Drink
3/9 to 3/13	Spring Break
3/16, 3/17, 3/19, or 3/20	Experiment #6: Analysis of Allentown Water for Chloride Ion
3/23, 3/27, 3/31, or 4/2	Experiment #7: Compleximetric Analysis of Allentown Water for Mg and Ca
3/24 or 3/26	No Labs (or snow-day make-ups)
3/30, 4/3, 4/7, or 4/9	Experiment #7 (Continued)
4/6, 4/14, 4/16, or 4/17	Experiment #8: Determination of Vitamin C in Citrus Drinks
4/20, 4/21, 4/23,	Experiment #9: Spectrophotometric Determination of

or 4/24

Aspirin
Check-Out

4/27, 4/28, 4/30,
or 5/1

Laboratory Exam

5/4 or 5/5

No Labs (or snow-day make-ups)

Note: *Laboratory syllabus is only a plan and may be subject to change. Any changes will be explained in class.*