De Anza College
Chemistry Department
Spring 2019

COURSE TITLE

Chemistry 1C-61/62 General Chemistry
Class 04/08/19 to 06/28/19

Meeting times: Sec 61/62	Lecture	6:00 – 7:15 PM,	TTh,	Room S55
Sec 62 (Staff)	Lab	2:30 – 5:20 PM,	TTh,	Room SC2208
Sec 61	Lab	7:30 – 10:20 PM,	TTh,	Room SC2208

INSTRUCTOR

Dr. John Cihonski
Contact: School e-mail: cihonskijohn@fhda.edu

OFFICE HOURS

TTh 5:00 - 6:00 PM in Chem Faculty office area

REQUIRED MATERIALS

1) Silberberg, Chemistry: The Molecular Nature of Matter and Change, any edition
2) General Chemistry Laboratory (De Anza 2015 edition) – see lab PDFs in http://deanza.edu/chemistry/Chem1B.html
3) 8.5 x 11 permanent bound laboratory notebook with "carbon" copies. Can be a used lab notebook from a prior lab.
4) Safety Goggles (must be approved by instructor)
6) Scientific calculator

Course Description: Aspects of the reactivity of aqueous solutions, including the application of equilibrium to investigate: colligative properties, such as boiling point elevation and freezing point depression; buffer solutions, which are solutions able to resist changes in pH due to small quantities of acid or base; solubility and the formation of precipitates, including the calculation of solubility through equilibrium constants; electrochemistry; and the formation of complex ions. The course will also cover the fundamentals of nuclear structure and radioactive decay

Grading Scheme

Minimum Course Score Grade (%)	Grade
92	A
80	B
65	C
55	D

Course Score formula

(3M + F + L)/580 = Grade

	Possible points
3 Midterm Exam (M) scores	300
F = Final exam score	200
L = Laboratory score	90
Total Possible Points	590

Dropping - It is the responsibility of the student to drop the class and to check out of the laboratory.

Attendance - Attendance is required for **all** laboratory sessions and highly encouraged for lectures. The course is impacted; there is neither make-up time in the course nor space for you to work in other sections. If you miss a lab, you need to discuss the issue with the instructor (valid reason and written documentations will be required).
• The 1st and 2nd unexcused missed labs will result in zeros.
• The 3rd unexcused missed lab will result in failing the course.

Lecture - Each of the three exams will be worth 100 points and the comprehensive final exam will be worth 200 points. If a student is absent during any exam, he/she will receive a grade of zero. At the discretion of the instructor, a makeup exam may be allowed for an urgent medical or legal situation which prevents a student from attending class. In such cases, all of the following requirements will apply: 1) Student must present documentation of the reason for absence (letter from doctor or court official, including address and phone number) to the instructor on the day student returns to school, 2) Exam must be made up within two days of missed exam, 3) Only one make-up exam is allowed per quarter. Unethical behavior of any kind will result in dismissal from the course with an F grade. Work must be shown on **all** problems (exam, homework, etc.) to receive credit. Bathroom breaks during an exam are discouraged.

Homework – Homework as noted on the Lecture and Exam schedule is optional. However it is important for your learning the material and it will help if you are on the border of a grade. "Homework" constitutes the problems related to each lesson (excluding the Comprehensive Exercises) that addresses the material covered and are answered in the back of the text. Homework is due the day of the exam covering that material. Each "Homework" will be graded 0, +1 or +2. A 0 means not turned in, +1 means turned in but incomplete (must see effort for credit though), +2 means you have at least tried every assigned problem. For credit WORK MUST BE SHOWN. Simply copying answers from the back of the book does not count. There are 6 topics in this

course, so 100% completion is worth 12 points or about the equivalent of one letter grade improvement on an exam.

Chemistry 1C: Sec 61/62 Lecture 6:00 – 7:15 PM, TTh, Room S55

	Topic	Chapter *	Problems *
1	Solutions and Colloids	13	1-118
2	Ionic Equilibria in Aqueous Systems	19	1-104
	Exam 1		
3	Electrochemistry	21	1-109
	Exam 2		
4	Transition Metals	23	1-97
5	Nuclear	24	1-88
	Exam 3		
	Final Exam Tuesday, June 25th 6:15 – 8:15 PM		

* Homework is from Silberberg and constitutes the indicated problems with answers in the appendix (indicated by color – red, blue, green and is edition dependent). Chapter numbers apply to all editions. Problem ranges above are for 8th edition but all editions will be close.

Laboratory - All laboratories are expected to be completed (see Attendance). Lab reports are due the next lab period within the first five minutes of the scheduled lab period. If a lab report is late it will be penalized twenty percent per day. For all laboratory experiments, the advance study assignment sheet must be completed and initialed by the instructor prior to the beginning of the lab period. Laboratory data sheets must also be initialed by the instructor before leaving the lab. The initialed Advance Study Assignment sheet and the initialed lab data sheet must be turned in with the final lab report. An incomplete report will receive a zero. Coming sufficiently late for a lab (as determined by the instructor) can result in your not being permitted to do the experiment.

Chemistry 1C: Sec 62 Lab 2:30 – 5:20 PM, TTh, Room SC2008
Sec 61 Lab 7:30 – 10:20 PM, TTh, Room SC2008

Week of	Tuesday	Thursday
Apr 7	Check-in	Freezing Point (1)
Apr 14	Freezing Point (2)	Buffers (1)
Apr 21	Buffers (2)	Ksp & Common Ion (1)
Apr 28	Ksp & Common Ion (2)	Anions (1)
May 5	Anions (2)	Electrochemistry (1)
May 12	Electrochemistry (2)	Cations (1)
May 19	Cations (2)	Cations (3)
May 26	Cations (4)	Cations (5)
June 2	Cations (6)	Cations (7)
June 9	Cations (8)	Cations (9)
Jun 16	Cations (10)	Check-out

For Lab section 61 all labs except Cations are worth 10pts. Cations will be worth 40 pts.

Laboratory Safety

Laboratory safety is an everyday assignment. Being safe in the lab is a top priority. The importance of safety in the laboratory will be reviewed on the first day of lab. Any unsafe behavior, intentional or not, will be noted and may be cause for dismissal from the class. Under NO circumstance are shorts and sandals allowed in the laboratory. You will be dismissed from the laboratory if you are not wearing appropriate protective clothing. For your protection, safety goggles with indirect ventilation and an ANSI minimum rating of Z87 must be worn at all times in the laboratory. One warning will be issued to any student that is observed wearing their goggles on their forehead, hanging them around their neck, etc. instead of wearing over their eyes. if the warning is disregarded, expulsion from the lab and a zero on the lab work may result.
Latex gloves will be provided for those experiments using chemicals that are hazardous to skin.

Chemical Disposal and Clean-up

As a concern for the environment and to follow county, state and federal law, proper chemical disposal is essential. Students who do not comply with directed procedures may be expelled from the lab or failed in the course for repeated offenses. Check with the instructor if you have any questions. All students are requested to do a conscientious and thorough job of cleaning up after themselves, whether it is in their own work area in the lab, or shared areas such as the chemical supply table and balance room.

Chem 1C Introduction & Format

Introduction:

- Review course syllabus – text, lab note book (bound with carbon copy), safety glasses, lab schedule, attendance, lab procedures, housekeeping & **safety rules (sign and turn in)**.
- *A major factor limiting lab efficiency is the use of cell phones and computers during the lab. To eliminate this distraction the only electronic device permitted in the lab is your calculator. Having a phone/computer visible in lab will result in a zero for the lab. This means that you will be working from your bound lab notebook write-up and for reference a photocopy of the lab procedure – provided by your instructor.*
- Lab Format:
    - Prelab – Have the prelab write-up completed prior to the lab and have it initialed/dated by instructor before the pre-lab discussion. **Not having a completed prelab means you are not prepared and you will receive a zero for the lab. If your prelab was not initialed prior to the prelab lecture it is late (-20%).**
    - Laboratories – The prelab write-up in your notebook will include:
        - The purpose of the lab
        - List of the safety issues & the main chemical and equipment needs
        - Sufficient procedural detail and the necessary data collection tables for you to be able to work from your notebook without a photocopy of the lab procedure.

      The intent of the notebook is to have a place to make notes and record the experimental results/information required for report completion. THIS DOES NOT HAVE TO BE IMMACULATE BUT IT DOES NEED TO BE EASY TO FOLLOW & UNDERSTAND!
    - *ALL data & related information **MUST** be collected directly in the lab notebook in INK. No writing on other paper and copying over to make it neat. (Penalty - 50% minimum)*
    - At the end of the lab have the experimental data collection checked & initialed
    - The calculations/results, discussion, conclusions and the synopsis page can be completed outside of class.
    - Final Lab Report – A final lab report consists of: a 1 page Lab Synopsis (typed or hand written) followed by the carbon copy of the lab which will include the initialed work pages, calculations, discussion and a results/conclusion statement. The final lab report is due at the beginning of the next experiment. **See following examples**

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Name: Flora Tang
Professor: Cihonski
Course: Chem 1B
Section: 01
Experiment #18 (Lab Manual)

Determination of K_a for a Weak Acid

Goal:

The pH of an unknown acid will be recorded after adding increments of NaOH to a solution. Through the data, the dissociation constant (K_a), half-equivalence point, and pKa can be calculated through graphing.

Experimental Overview:

A weak acid/base does not completely dissociate in solution. It only dissociates to a certain extent, which can be given by the dissociation constants K_a or K_b. Another important aspect of this experiment is the half-equivalence point, when the amount of base needed to titrate half of the acid present is added into the solution. In this experiment, NaOH is used to titrate an unknown weak acid. The pH is recorded every 1-2 drops, and the amount NaOH added (mL) vs. pH is graphed. By finding the equivalence point, the half-equivalence point can also be determined, as well as the pKa and dissociation constant K_a.

- $pH = -\log[H_3O^+]$
- $pKa = pH$
- $K_a = [H_3O^+][0.5x]/[0.5x] = [H_3O^+] = 10^{-pH}$

Results:

$pH = pKa = 4.1$ ✓

$K_a = 10^{-4.1} = 7.94 \times 10^{-5}$ ✓

One problem that may go wrong with these results is the determination of half-equivalence point through observation. The graphed line may not be perfect, since it was drawn by hand, so the pH may be a higher/lower number, as well as the K_a.

Conclusion:

- $K_a = 7.94 \times 10^{-5}$
- Experimental Tips: Use a computer system to draw a better graph next time in order to get a more accurate determination of the half-equivalence point.

UNK # ?

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Kathy Atabakhsh

Chem 1B Summer 14

Chihonski

7/18/2014

Experiment 18

Determination of Ka for a Weak Acid

The objectives for this experiment includes being able to determine the dissociation constant, Ka, for a weak acid by titration by NaOH, a standardized base. It also includes learning how to use a pH meter, calculating pH and pOH, and calculating the percent of ionization.

In this lab, we obtained an unknown sample of a weak acid and mixed it thoroughly with DI water in an Erlenmeyer flask. We then used a 0.098 M sample of NaOH to titrate the weak acid solution in order to reach the equivalence point. While titrating, we used a pH meter in order to determine the rise in pH with every drop (0.05 mL).

The results I needed to calculate and determine for this experiment included drawing a graph that showed all the pH values obtained per drop of NaOH base during titration. This graph helped me determine the equivalence and half-equivalence point which was 1.2 mL and 0.6 mL. By using the pH of 5.54 at the half-equivalence point, we were able to determine Ka using antilog, which was 2.88x10^-6. By using the equivalence point (0.0012 L) multiplied by the molarity of NaOH (0.098 mol), we were able to find the moles of NaOH which is equivalent to moles of unknown acid. By using the grams of unknown (0.0215 g) divided by moles of the unknown (0.0001176 mol), I got 182.82 g/mol for my molar mass of unknown acid.

Conclusion:

- Determined that the molar mass of my unknown acid #24 was 182.82 g/mol.
- Equivalence point was reached at 1.2 ml NaOH, and half-equivalence point was reached at 0.6 mL NaOH.
- Using obtained values, Ka was calculated to be 2.88x10^-6.

Good

From the American Chemical Society Safety In Academic Laboratories Guidelines, 7th Ed., the following mandatory minimum safety requirements must be followed by all students and be rigorously enforced by all Chemistry faculty:

1) Chemistry Department-approved safety goggles purchased from the De Anza College bookstore (NOT safety glasses) must be worn at all times once laboratory work begins, including when obtaining equipment from the stockroom or removing equipment from student drawers, and may not be removed until all laboratory work has ended and all glassware has been returned to student drawers.
2) Shoes that completely enclose the foot are to be worn at all times; NO sandals, open-toed, or open-topped shoes, or slippers, even with socks on, are to be worn in the lab
3) Shorts, cut-offs, skirts or pants exposing skin above the ankle, and sleeveless tops may not be worn in the lab: ankle-length clothing must be worn at all times
4) Hair reaching the top of the shoulders must be tied back securely
5) Loose clothing must be constrained
6) Wearing "...jewelry such as rings, bracelets, and wristwatches in the laboratory..." should be discouraged to prevent "...chemical seepage in between the jewelry and skin...".
7) Eating, drinking, or applying cosmetics in the laboratory is forbidden at ALL times, including during lab lecture
8) Use of electronic devices requiring headphones in the laboratory is prohibited at ALL times, including during lab lecture
9) Students are advised to inform their instructor about any pre-existing medical conditions, such as pregnancy, epilepsy, or diabetes, that they have that might affect their performance.
10) Students are required to know the locations of the eyewash stations, emergency shower, and all exits
11) Students may not be in the lab without an instructor being present
12) Students not enrolled in the laboratory class may not be in the lab at any time after the first lab period of each quarter.
13) Except for soapy or clear rinse water from washing glassware, NO CHEMICALS MAY BE POURED INTO THE SINKS; all remaining chemicals from an experiment must be poured into the waste bottle provided.
14) Students are required to follow the De Anza College Code of Conduct at all times while in lab: “horseplay”, yelling, offensive language, or any behavior that could startle or frighten another student is not allowed during lab;
15) Strongly recommended: Wear Nitrile gloves while performing lab work; wear a chemically resistant lab coat or lab apron; wear shoes made of leather or polymeric leather substitute.

By signing below, I,

_____,
First Name Family Name

acknowledge that I fully understand and agree to abide by the laboratory safety rules listed above. Further, I acknowledge that my failure to abide by these rules will result in my being dropped from this chemistry class immediately.

_____ _____
Signature Date

Student Learning Outcome(s):

*Apply the principles of equilibrium and thermodynamics to electrochemical systems.
*Apply the principles of transition metail chemistry to predict outcomes of chemical reactions and physical properties.
*Evaluate isotopic decay pathways.
*Demonstrate a knowledge of intermolecular forces.