

De Anza College
Chemistry Department
Winter 2019

COURSE TITLE

Chemistry 1B-61 General Chemistry

Class 01/07/19 to 04/29/19

Meeting times: Lecture 6:00 – 7:15 PM, MW, Room SC2204

Lab 7:30 – 10:20 PM, MW, Room SC2204

INSTRUCTOR

Dr. John Cihonski

Contact: School e-mail: cihonskijohn@fhda.edu

OFFICE HOURS

MW 5:00-6:00 PM in Chem Faculty office area or catch me in the lab

REQUIRED MATERIALS

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

Course Description: Chemistry 1B is the second part of a year-long general chemistry sequence for science and engineering majors. The course covers the physical aspects of chemistry with an emphasis on problem solving. Topics: gas law, intermolecular forces, liquid and solid properties, kinetics, equilibrium, acid-base chemistry and equilibrium in aqueous systems, and thermodynamics.

Grading Scheme

Minimum Course Score Grade (%)	Grade	Course Score formula (3M + F + L)/570 = Grade	
92	A		
80	B		Possible points
65	C	3 Midterm Exam (M) scores	300
55	D	F = Final exam score	200
		L = Laboratory score	70
<hr/>			
Total Possible Points			570

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 with documentation is 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 a zero for the exam. **Work must be shown on all problems to receive credit.** Bathroom breaks during an exam are discouraged.

Homework – Homework is important for your learning the material and it will help if you are on the border of a grade. You are encouraged to do the recommended homework and text example problems. “Homework” constitutes the text problems with answers in the appendix related to each chapter (excluding the Comprehensive Exercises) that address the material covered and are answered in the back of the text.

Chemistry 1B: Lecture 6:00 – 7:15 PM, MW, Room SC2204

	Topic	Chapter	Problems
1	Gases and the Kinetic Molecular theory	5	5.1 to 5.80*
2	Intermolecular Forces	12	12.1 to 12.71*
Exam 1 (Covers Chem 1A & Gas Topics)			
3	Kinetics	16	16.1 to 16.78*
4	Equilibrium	17	17.1 to 17.73*
Exam 2			
5	Acid-Base Equilibrium	18	18.1 to 18.144*
6	Thermodynamics	20	20.1 to 20.83*
Exam 3			
Final Exam Monday, March 25 th 6:15 – 8:15 PM			

* Homework is from the Silberberg and constitutes the indicated problems with answers in the appendix (marked by color – red, blue, green and is edition dependent).

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 1B: Lab 7:30 – 10:20 PM, MW, Room SC2204

Week of	Monday	Wednesday
Jan 07	Check-in	B1 - Molar volume (1)
Jan 14	B1 - Molar volume (2)	Open
Jan 21	Holiday	Open
Jan 28	B7 - Green Salt (1)	B7 - Green Salt (2)
Feb 04	B7 - Green Salt (3)	B7 - Green Salt (4)
Feb 11	B3 - Kinetics (1)	B3 - Kinetics (2)
Feb 18	B3 - Kinetics (3)	B3 - Kinetics (4)
Feb 25	B4 - K_c by Spec 20 (1)	B4 - K_c by Spec 20 (2)
Mar 04	B5 - K_a of a weak acid(1)	B6 - pK_a of indicator (1)
Mar 11	B6 - pK_a of indicator (2)	B8 - Calcium hydroxide (1)
Mar 18	B8 - Calcium hydroxide (2)	Check-out

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 1B 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 pages 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 conclusion. The final lab report is due at the beginning of the next experiment. **Show examples**

Name: Flora Tang ¹⁰/₁₀
 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 .

- $\text{pH} = -\log[\text{H}_3\text{O}^+]$
- $\text{pKa} = \text{pH}$
- $K_a = [\text{H}_3\text{O}^+][0.5x]/[0.5x] = [\text{H}_3\text{O}^+] = 10^{-\text{pH}}$

Results:

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

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 # ?

10/10

Kathy Atabakhsh

Chem 1B Summer 14

Chihonski

7/18/2014

Experiment 18

Determination of K_a for a Weak Acid

The objectives for this experiment includes being able to determine the dissociation constant, K_a , 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 K_a using antilog, which was 2.88×10^{-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, K_a was calculated to be 2.88×10^{-6} .

GOOD

Student Learning Outcome(s):

- *Evaluate the principles of molecular kinetics.
- *Apply principles of chemical equilibrium to chemical reactions.
- *Apply the second and third laws of thermodynamics to chemical reactions.