Berkeley City College

Chemistry 1B Syllabus, Fall 2017
Instructor: Siraj Omar, Ph.D.
(Email: sirajomar@sbcglobal.net)

I. **Meeting Time:**

Lecture:	0900 – 1150	MF	(Room 034 BCC)
Lab:	0900 – 1150	W	(Chem Lab, Room 521 BCC)
Office hours:	0830 – 0900	MF	(Room 034 BCC)
	1400 – 1600	MW	(BCC LRC; drop-in)
	1530 – 1420	Th	(Room 523 BCC; by appointment)

II. **Description & Objectives**

Chem 1B, the second part of college general chemistry, will cover materials under the following topics: chemical kinetics; equilibria (chemical and in aqueous solutions); acids, bases and buffer solutions; entropy and free energy; redox reactions and electrochemical processes; the chemistry of main group elements and their uses; the chemistry of transition elements and their coordination compounds; nuclear chemistry, and an introduction to organic and biological compounds.

As in Chem 1A, this course emphasizes on the understanding of basic chemical principles associated with chemical processes occurring in the laboratories and in nature, as well as their industrial significance. Problem solving and laboratory exercises are important aspects in this course. There will be weekly experiments and homework assignments that will help you acquire essential practices and skills. (Pre-requisite: obtain grade C (or better) in Chem 1A)
(Chem 1B is a pre-requisite for organic chemistry 12A. It is a transferrable course to UC and CSU; a required subject for all science majors, medical program, and degrees in dentistry and pharmacy.)

Student Learning Outcome:

Upon completing this course students will acquire the following knowledge and skills:

1. Solve quantitative chemistry problems and integrate multiple ideas, that include incorporating stoichiometric and algebraic relationships, in problem solving processes.
2. Explain qualitative trends in physical and chemical properties of elements and use molecular level concepts (physical and/or chemical) to explain macroscopic properties of matter.
3. Perform experiments according to laboratory safety procedures; collect and analyze experimental data; interpret results that include graphs construction; write organized laboratory reports.

III. **Books and Supplies:**

A. Required Materials:

- Zumdahl & Zumdahl, "CHEMISTRY" 9th Edition, Brooks/Cole Cengage Learning.
- Chem 1B Laboratory Manual, Siraj Omar, Berkeley City College (purchase from Copy World)
- Laboratory Notebook, Safety goggles, and Scientific Calculator

B. Recommended Materials: Study Guide to accompany your text and Lab coat or apron.

IV. **Grading:**

A. Grade Weighting Factors:

Tests	39%
Final Exam	20%
Quizzes	16%
Laboratory	20%
Homework	5%

B. Grade Percent Distributions:

A:	$\geq$ 90%
B:	79 - 89%
C:	65 - 78%
D:	51 - 64%
F:	$\leq$ 50%

C. Note that lab, homework, quiz, and test scores are not equivalent. The percentage score that is important.

V. **Homework Assignments**

Homework selected end-of-chapter problems will be assigned. The assigned problems and the due date for each problem set are contained in this syllabus. It is important that you show the complete solutions for each problem. No credit will be awarded if you simply write the answers without showing the work or calculations. Moreover, working on the solutions will provide you with the necessary practice in problem solving that are essential in this course.

VI. **Quizzes, Mid-terms and Final Exam:**

There will be a total of 10 quizzes, 3 midterm tests and a final exam. There will be NO make-up on quizzes, midterm tests or finals, but only the top eight (8) of your quiz scores will be counted into the final grades. In general, each midterm test will cover materials from 3 chapters discussed during the previous 3-4 weeks, but the final exam will be comprehensive. In addition, you will also take an ACS Exam for General Chemistry, which covers both Chem 1A and 1B materials. The ACS exam will account for 15% of your final exam grades (not 15% of the final grades). (The study guides for the ACS Exam are available in the library (reserved section). Dates for midterms and the final exam are indicated in the class schedule (given in this syllabus). If there is a scheduling conflict on any of these dates, please let me know at lease one week before the scheduled date, and an earlier date will be arranged for you to do a make-up exam. If you miss a midterm or the final exam due to sickness, you must provide a medical certificate or a doctor's note.

VI. **Laboratory**

In this class you will perform a total of 12 experiments and you are required to write a complete laboratory report on each experiment. The Lab report must be turned in within one week the experiment is completed. Points will be deducted from late reports. During lab you may perform an experiment with a partner and you will be sharing the experimental data. However, all lab reports must be written individually. Each student is responsible for writing and turning in his/her own lab reports. DO NOT copy (plagiarize) your partner's or other student's lab reports. You will be given a "zero" for your lab reports if it is determined that you have plagiarized other people's work.

Please read the following guideline for the laboratory preparation and for writing lab reports:

1. You must read the experiment and complete the pre-lab exercises before coming to the class. Pre-laboratory exercises must be turned in at the beginning of the lab period. You WILL NOT be allowed to perform the experiment if you have NOT read the experiment or done the pre-labs.
2. You MUST have a lab notebook that is dedicated strictly for your laboratory work and it should not be used as a lecture note book. The lab notebook is where you keep records of all experimental data (measurements and/or observation). (You will be asked to leave the class if you come without a lab notebook and the grades for that experiment will be forfeited.

3. **Preparing Lab Notebook and Writing Lab Reports**
   - *Lab notebook*: start on a new page for each experiment and you must have the following written in the lab notebook before you come to the laboratory perform any experiment: (1) *Title*; (2) *Objective*; (3) *Procedure* (outline or list steps to be carried out), and (4) *Data Table*.
     Please do this in your lab notebook before the lab period, so that you're familiar what needs to be done during the experiment and not waste precious laboratory time.
   - *Lab report*: Organize lab report using the following format: (1) *Title*; (2) *Objective*; (3) *Overview*; (4) *Procedure*; (5) *Data Table*; (6) *Calculations* (if applicable); (7) *Summary*; (8) *Answers to Post-lab questions*. The final lab reports must be organized according to the format mentioned above, or points will be deducted.
4. At the end of each experiment, please show your data to your lab instructor before leaving the lab. (Your lab instructor may ask you to complete some of the calculations before allowing you to leave.)
5. You are encouraged to type the final lab reports. If you turn in a hand-written report, make sure they are written in either black or blue ink, but not in any other ink colors.

6. Regardless whether you type or hand-written your lab reports, **there must be at least 1 inch margins (or borders) on the top, bottom, left, and right of each page of your reports.** Also, please turn in the original copy or a photocopy of the original data. **Carbon copies will NOT be accepted.**
7. The complete lab reports must be turned in within one week the experiment is completed; points will be deducted from late reports. However, lab reports that are more than 3 weeks overdue will NOT be graded.

VIII. **Safety in the Laboratory**

1. Safety in the laboratory is of primary importance. You must wear safety goggles at all time during laboratory classes, regardless of whether you are doing an experiment or not.
2. Eating and drinking are NOT ALLOWED in the laboratory (Bottle drink is OK).
3. You must wear close-toed shoes. Sandals or flip-flops are NOT allowed in the chemistry labs.
4. You must wear clothing that protects your body. Shorts, short skirts, and sleeveless shirts/blouse are not allowed. Avoid wearing flammable synthetic materials. Do not wear contact lenses.
5. Do experiment that is assigned by the instructor. Any kind of unauthorized experimentation with chemicals is strictly prohibited.

VII. **Reading/Studying**

- It is crucial that you read the chapter before coming to class. If you come to class without knowing what topic(s) the lecture will cover, you will not gain anything during the lecture.
- You must pay attention during lectures and study the materials outside the class periods. Studying is not the same as reading. It is an active process, which includes summarizing concepts in your own words and memorizing formulas, as well as solving problems. You must do the homework assignments to fully grasp the concept(s) covered during each lecture.
- In this class you should expect to spend 10-12 hours per week outside class periods to read and review materials, do homework assignments, and write lab reports. Additional hours may be needed to study for quizzes or examinations.

VIII. **Academic Decorum and Attendance**

- Attendance in lectures and labs are important and will be recorded. Be sure to sign the attendance sheets. Please contact me if you find yourself in a situation that might cause you to miss more than two lecture periods. You are strongly encouraged to take notes during lectures and participate during class discussions. Do Not do your homework assignments during lectures.
- Be punctual! If you arrive late, enter quietly. If you have to leave the class before the end of the period, please be seated where you can leave with the minimum disruption to the class.

<u>PLEASE TURN OFF SMART PHONES, I-PADS, TABLETS AND LAPTOPS DURING LECTURES</u>

Please respect the desire of others to learn. Therefore, please DO NOT TALK during lectures. If you have any questions regarding the lecture materials, please raise your hand.

IX. **Integrity**

- All work submitted for grading must be your own. Copying is cheating and is an unacceptable behavior. Cheating during quizzes, tests, or examinations will NOT be tolerated and it will earn you an automatic zero for those quizzes or examinations.
- Be a full and active participant when you work on an assignment with others. If you just copy the groups or your partner's data, you haven't learned anything and you are wasting your time.

Academic Calendar for Fall 2017

August 21	M	Fall Semester Classes Begin
August 26	S	Saturday Classes Begin
August 26	S	Last day to Add without Permission Number or Add Card
September 1	F	Last day to Add Regular Session Classes in person with a Permission Number on Add Card
September 4	M	Last Day to Drop Regular Session Classes without a “W”
September 4	M	Last day to Add Regular Session Classes online with an Instructor issued Permission Number
September 4	**M**	**Labor Day Holiday**
September 5	T	Census Roster Due – Instructors verify enrollment in classes
September 8	F	Last Day to File for PASS/NO PASS Grading option for Regular Session Classes
October 20	F	Last Day to file petitions for AA or AS Degree/Certificate
November 10	**F**	**Veteran’s Day Holiday**
November 15	W	Last Day to Withdraw from Regular Se4ssion Classes and Receive a "W"
November 15	W	Attendance Verification Day
Nov 23 – 25	Th-S	Thanksgiving Holiday
December 9	S	Saturday Instruction Ends
December 11-15	M-F	Final Exam Week
December 15	F	Fall Semester Ends

Chem 1B Fall 2017 Tentative Schedules for Lectures, Labs, Quizzes, and Midterms

Wk	Date	Lect/Lab/Quiz	Lecture/Lab Topics	
1	08/21	Lecture 1	Course Outline; Chemical Equilibrium (13.1 - 13.3)	
	08/23	*Lab-1*	Lab Safety Video and Safety Quiz;	
	08/25	Lecture 2	Chemical Equilibrium (13.4 - 13.7)	
2	08/28	Lecture 3	Acids and Bases (14.1 – 14.5)	
	08/30	*Lab-2*	Expt-B2: *Le Chatelier's Principle*	
	09/01	Lecture 4	Acids and Bases (14.6 – 14.12);	***Quiz #1*** (Chapter 13)
3	09/04	No Class	Labor Day Holiday	
	09/06	*Lab-3*	Expt-B3: *Determining an Equilibrium Constant*	
	09/08	Lecture 5	Acid-Base and Buffer Solution (15.1 – 15.2);	***Quiz #2*** (Chapter 14)
4	09/11	Lecture 6	Buffers and Acid-Base Titrations (15.3 – 15.5);	
	09/13	*Lab-4*	Expt-B4: *Acid-Base Equilibrium and Buffer Solutions*	
	09/15	Lecture 7	Solubility Equilibria (16.1 – 16.2);	
5	09/18	Lecture 8	Test Review;	***Quiz #3*** (Chapter 15)
	09/20	*Lab-5*	Expt-B5: *Acid-Base Titration pH-Curve*	
	09/22	**Test #1**	(Chapters 13, 14 & 15; scantron is needed)	
6	09/25	Lecture 9	Solubility Equilibria (16.3);	
	09/27	*Lab-6*	Expt-B6 – *Solubility Product Constant*	
	09/29	Lecture 10	Chemical Kinetics (12.1 – 12.4)	***Quiz #4*** (Chapter 16)
7	10/02	Lecture 11	Chemical Kinetics (12.5 – 12.7)	
	10/04	*Lab-7*	Expt-B1: *The Rate of an Iodine Clock Reaction*	
	10/06	Lecture 12	Entropy and Spontaneity (17.1 – 17.5);	
8	10/09	Lecture 13	Entropy and Spontaneity (17.6 – 17.9)	***Quiz #5*** (Chapter 12)
	10/11	*Lab-8*	Expt-B7: *Thermodynamics of the Borax Solubility*	
	10/13	Lecture 14	Electrochemistry (18.1 – 18.5)	
9	10/16	Lecture 15	Test Review;	***Quiz #6*** (Chapter 17)
	10/18	*Lab-9*	Expt-B8: *Oxidation-Reduction Reactions*	
	10/20	**Test #2**	(Chapters 12, 16, and 17; scantron is needed)	
10	10/23	Lecture 16	Electrochemistry (18.6 – 18.9)	
	10/25	*Lab-10*	Expt-B9: *Electrochemical Cells*	
	10/27	Lecture 17	Nuclear Chemistry (19.1 – 19.4)	***Quiz #7*** (Chapter 18)
11	10/30	Lecture 18	Nuclear Chemistry (19.5 – 19.7);	
	11/01	*Lab-11*	Expt-B11: *Qualitative Analysis of Cations*	
	11/03	Lecture 19	Trends in Atomic Properties & Representative Elements (20.1 – 20.4)	
12	11/06	Lecture 20	Representative Elements (20.5 – 20.9) ;	***Quiz #8*** (Chapter 19)
	11/08	*Lab-12*	Expt-B12: *Qualitative Analysis of Anions*	
	11/10	No Class	Veteran's Day Holiday	

Wk	Date	Lect./Lab/Quiz	Lecture/Lab Topics
13	11/13	Lecture 21	Representative Elements (20.10 – 20.14)
	11/15	Lecture 22	Work Sheets & Test Review; ***Quiz #9*** (*Chapter 20*; TH)
	11/17	Lecture 23	Transition Metals and Coordination Compounds (21.1 – 21.4);
14	11/20	**Test #3**	(Chapters 18, 19, & 20; scantron is needed)
	11/22	No Lab	
	11/24	No Class	Thanksgiving Break
15	11/27	Lecture 24	Complex Ions & Metallurgy (21.5 – 21.8);
	11/29	*Lab-14*	Expt-B13: *Thermochemistry of Complex Ion*
	12/01	Lecture 26	Hydrocarbons: Alkanes, Alkenes, Alkynes, Benzene (22.1 – 22.3);
16	12/04	Lecture 25	Compounds with Functional Groups (22.4);
	12/06	**ACS Exam**	(It accounts for 15% of your final exam grades)
	12/08	Lecture 27	Final Review; ***Quiz #10*** (Chapter 21)
			(Last day to turn in lab reports for experiments B12 & B13.
			All other lab reports will not be accepted.)
17	12/11	**Final Exam**	(Comprehensive: chapters 12, 14, 15, 18 & 21 are very important)

(**All experiments require formal lab write-up**)
(All formal lab reports must be typed with 1.5 spacing, and please use a font no smaller than size 10, except for the calculations and chemical equations, which may be hand-written. Please write everything in INK; pencil should NOT be used in lab report writing.)

Formal Lab Reports MUST BE ORGANIZED in the the following format:

1. Title of experiment;
2. Objective(s)
3. Overview
4. Procedure
5. Data Table(s)
6. Calculations (including error analysis if applicable)
7. Results Summary
8. Answers to post-lab questions

Homework Assignments for Chem 1B Fall 2017

Textbook: Chemistry by Zumdahl & Zumdahl, **9th Edition**.

Chapter-13: 15, 21, 24, ***27**, 30, 32, 40, ***45**, 49, ***51**, ***53**, 59, ***61**, 65, ***68**, 72, ***78**, 82, ***85**, 96, ***98**, ***102**, 105, ***106**, ***115**. (Due: 9/01/2017)

Chapter-14: 38, ***48**, 51, 56, 61, ***67**, ***70**, ***73**, 75, 87, 91, ***97**, 101, ***107**, 109, ***119**, 131, 136, 137, ***146**, ***147**, ***149**, 175, ***180**, ***187**. (Due: 9/08/2017)

Chapter-15: ***21**, 25, 27, ***35**, ***38**, ***41**, 44, 45, 46, ***53**, ***57**, 59, ***61**, 65, ***67**, 80, ***83**, ***84**, 85, ***96**, 99, 102, 110, 117, ***119**. (Due: 9/22/2017)

Chapter-16: ***22**, 25, ***28**, 30, ***37**, 40, 44, 49, ***51**, ***53**, 58, ***63**, ***64**, 66, ***72**, ***73**, 77, ***81**, 83, 89, 90, 100, ***101**, 107, ***111**. (Due: 10/02/2017)

Chapter-12: 23, 26, 27, 29, ***30**, 34, ***36**, ***37**, 41, ***42**, 48, ***51**, ***54**, 58, 61, ***68**, 70, ***75**, ***78**, ***91**, 92, 93, ***108**, ***113**, 115. (Due: 10/09/2017)

Chapter-17: ***32**, 34, ***36**, 40,* **41**, 45, ***47**, ***53**, 55, ***57**, 58, ***62**, ***68**, 71, 74, ***75**, 79, ***88**, ***89**, 97, 105, 108, ***112**, ***119**. (Due: 10/20/2017)

Chapter-18: ***29**, ***31**, ***37**, ***39**, 45, 50, 51, ***61**, ***69**, 71, ***77**, 82, ***84**, 88, ***89**, 92, ***93**, ***96**, ***98**, 101, 107, 111, 119, ***131**, ***149**. (Due: 10/30/2017)

Chapter-19: ***11**, 12, ***17**, 19, 21, ***22**, 24, ***26**, 32, ***34**, 36, ***37**, ***39**, 42, ***45**, ***50**, 55, 66, ***67**, 70, 72, 77, ***81**, ***84**, 88. (Due: 11/08/2017)

Chapter-20 ***11**, ***12**, 13, ***20**, 23, 28, ***29**, 37, 38, 48, ***51**, ***56**, 63, ***66**, ***68**, 70, ***73**, 76, 77, ***78**, 79, ***97**, 102, ***104**, ***110**. (Due: 11/20/2017)

Chapter-21: ***21**, ***24**, 31, 32, ***35**, ***37**, 39, ***40**, ***45**, 46, ***51**, ***54**, 59, 60, ***62**, ***65**, ***73**, 75, 78, 79, ***81**, ***91**, 99, ***101**. (Due: 12/08/2017)

Important notes on homework:

- You're advice to attempt all problems listed above. However, problems in **bold** type with asterisks (*) are those that will be graded; other problems are for practice.
- Show all work/calculations clearly and in an organized manner – if calculations are not provided you will not receive any credit for your work.
- Do not cramp your work – have empty lines between problems. If I cannot find or follow your work, it will not get graded.
- Re-write the questions for problems that require you to indicate the number of significant figures, non-algebraic problems that involve only mathematical operations, or those asking classifications of matter.

Laboratory Notebooks and Laboratory Reports

Laboratory Notebook

Science is not a list of facts that you have to memorize. It is a process that involves gathering information and collecting data, analyzing those data, providing critically thinking and discussion what all those data and information mean, and then arriving at some conclusion based on the information and data collected. Whatever conclusion that one has arrived based on data collected in one study or set of studies will be tested and verified by another set of studies (similar or otherwise). Therefore, scientists must keep records of the methodology and results of their experiments so that they can be repeated, checked and verified by others. Their experiments and experimental results, as well as the conclusions, are compiled in a dedicated **laboratory notebook.** Like those scientists, you are required to keep a laboratory notebook that is dedicated for the laboratory component of this class. You will record all experimental data, observations and results (including calculations) in this lab notebook. Your laboratory instructor will inform you the type of notebooks that may be used for this class. In general, your laboratory notebook must have a carbon copy, so that as you turn a set of experimental data and results for grading, you still have a copy of the data. You must keep your laboratory notebook ***neat*** and ***organized***. Your laboratory notebook should only be used for this purpose; it should NOT be used as a lecture notebook or for working on homework assignment problems.

The following is a guideline how you will be expected to organize and maintain your laboratory notebook:

1. Your laboratory notebook MUST be permanent bound notebooks; loose or spiral bound notebooks are not acceptable.
2. Leave the first 2-3 leaves of the notebook for table of contents. As you begin an experiment, you should enter the number and title of the experiment and the pages it is located in the notebook.
3. Start on a fresh page for each experiment:
   a. **Title**: At the top of this page, write the Number and Title of the experiment, and the date the experiment is carried out;
   b. **Objective:** Write the Objective statement of the experiment in a complete sentence;
   c. **Overview:** Write the experimental overview. (If you don't have time to do this, leave the rest of the first page and the next one for you to write the Overview later.) If you are planning to type your final lab report, skip this Overview section in the Lab Notebook, but you will write the Overview in the final lab report;
4. **Procedure**: On the third page (if you are not going to type your report) OR after the Objective (if you are going to type your report for this experiment), write the Procedure: list all the steps involve in the experiment in chronological order that is easy for you to follow during the experiment – numbering the experimental steps would make sense. You will refer only to your laboratory notebook to perform the experiment, and not to the lab manual;
5. **Data Tables:** After the Procedure section, prepare one or more Data Tables as necessary. All experimental data must be organized in tabulated format and properly labeled; leave enough spaces for data entry, possible errors and corrections. DO NOT cramp your data or make the data entry all over the place. (You MUST make sure that your laboratory instructor is able to find your entry within seconds.)
6. **Data Entry**: All data and observation MUST be entered directly into your laboratory notebook in non-erasable INK; scratch papers and pencils will NOT be permitted in the laboratory. Data values must contain significant figures consistent with the precision of the measuring devices. For examples, masses obtained on a centigram balances must contain two (2) digits after the decimal point, but masses obtained on an analytical balance must have four (4) digits after the decimal point. Volumes obtained using graduated cylinders must contain only one (1) digit after the decimal point, but those obtained using burets or pipets must have two (2) digits after the decimal points.
7. **Calculation**: Show all calculations wherever and whenever required. Organize and properly label each calculation. Round off the final answers to the correct number of significant figures.
8. **Result Summary**: Briefly state what you have discovered/determined in this experiment and whether the objective of the experiment is achieved. Give reason(s) if it is not – provide possible source(s) of errors. (Note: You are not required to write this section in the laboratory notebook if you type your final lab report.)

Laboratory Reports

You are encouraged to type your final laboratory reports. It would make your reports look neat and professional, and easy to read. Regardless, each final laboratory report must be organized in the following format, which must be strictly adhered to:

1. **Your Name**:_____ **Partner(s)**:_____

   Date: _____
2. **Experiment Number and Title**
3. **Objective:**
4. ***Overview:**
5. **Procedure Summary:**
6. **Data:**
7. **Calculation:**
8. ***Error Analysis** (if applicable)
9. **Result Summary**

***Overview**:

An "Overview" is a brief summary that explains the chemical concept/principle of the experiment. If the experiment involves one or more chemical reactions, you must write the balance equations for those reactions and provide explanations that will link the outcome of those reactions to the objective. Mention what data will be collected during the experiment and what calculations will be carried; provide the mathematical formulas or equations that will be used in the calculations.

However, if the primary objectives of the experiment are to observe chemical reactions and to write balanced equations of those reactions, then you do not have to write any equations in the *Overview*. Do not write the detail of the experimental procedure in the Overview section.

***Error Analysis** (only if applicable)

Mean and standard deviation are calculated using the following formulas:

$$\textit{Mean}\ (\overline{X}) = \frac{\sum X_i}{n}; \qquad \textit{Standard deviation} = \sqrt{\frac{(X_i - \overline{X})^2}{(n-1)}}$$

where X_i are individual data values and $\overline{X}$ is the mean of the sum of X_i

If the true or acceptable value of the quantity determined in the experiment is known, express the accuracy of your result in term of percentage error, such that:

$$\%\ \text{Error} = \frac{(\text{Experimental Value} - \text{True Value})}{\text{True Value}} \times 100$$

Sometimes, for limited data the precision of experimental results maybe expressed in the form of *Percent Relative Deviation* (PRD), where

$$\text{PRD} = \frac{(\text{Highest value} - \text{Lowest value})}{\text{Average value}} \times 100$$

[Note: not every experiment will require an error analysis. Your laboratory instructor will inform you which experiments require error analyses.]

An Example of Laboratory Report:

Title: Chemical Kinetic – Iodine-Clock Experiment

Objective

In this experiment we will determine the rate law and the activation energy of an iodine-clock reaction between peroxodisulfate and iodide ions. The effect of catalyst on reaction rate will also be observed.

Overview/Concept of Experiment

The rate law for the following reaction will be studied:

$$S_2O_8^{2-} + 3\,I^- \rightarrow 2\,SO_4^{2-} + I_3^-; \qquad \text{(Eqn-1)}$$

For which the rate law is: Rate = $k[S_2O_8^{2-}]^x[I^-]^y$

where k is the rate constant and x and y are the rate order with respect to each reactant. To obtain the rate law for the reaction, we need to determine the rate constant k and the rate orders x and y. The rate order x will be determined by varying $[S_2O_8^{2-}]$, while keeping $[I^-]$ constant. Similarly, the rate order y will be determined by varying $[I^-]$ while keeping $[S_2O_8^{2-}]$ constant.

*(Provide all the equations that allow you to derive the values of the rate orders x and y.)

The kinetic study in this experiment also requires the determination of the initial rate of Eqn-1. To accomplish this, Eqn-1 is coupled with Eqn-2 below:

$$I_3^- + 2\,S_2O_3^{2-} \rightarrow 3\,I^- + S_4O_6^{2-}; \qquad \text{(Eqn-2)}$$

Adding Eqn-1 and Eqn-2 yields the net equation (Eqn-3):

$$S_2O_8^{2-} + 2\,S_2O_3^{2-} \rightarrow 2\,SO_4^{2-} + S_4O_6^{2-}; \qquad \text{(Eqn-3)}$$

Eqn-2 indicates that as long as $S_2O_3^{2-}$ is present, I_3^- will not accumulate and the dark-blue I_2-starch complex will not form. Since the initial concentration of $S_2O_3^{2-}$ is much lower than that of $S_2O_8^{2-}$, the former is quickly used up, which than allows I_3^- to accumulate and resulting in the appearance of dark-blue solution due to I_2-starch complex. Using the reaction stoichiometry of Eqn-3 we can the initial rate of this reaction (Eqn-1) as follows:

$$\text{Initial Rate} = \frac{\Delta[S_2O_8^{2-}]}{\Delta t} = \frac{\frac{1}{2}\Delta[S_2O_3^{2-}]}{t} = \frac{\frac{1}{2}[S_2O_3^{2-}]_i}{t}$$

Where t and $[S_2O_3^{2-}]_i$ is the initial concentration of $S_2O_3^{2-}$ in the reaction mixture and t is the elapsed time between the mixing of solutions and the appearance of dark blue I_2-starch complex.

Temperature is kept constant throughout the determination of rate law. Once the rate orders x and y are known, the rate constant k can be calculated from the measured rates and the initial concentration of each reactant (in Eqn-1). The effect of temperature on rates will be determined by measuring reaction rates at different temperatures using the same set of concentrations. While the effect of catalyst will be done by comparing rates of reaction at constant temperature in the present and absent of a catalyst. The detail of the calculations to determine x, y and k is given in the lab manual: General Chemistry 1B laboratory Manual.

Five Major Reasons Why Students Fail Chemistry

1. Insufficient Math Preparation

Math, especially algebra, is an essential tool in chemistry. To be able to solve chemistry problems requires that you understand basic algebra and you must have the ability to transform word problems into mathematical expression. If you think that your math is a bit rusty, get help immediately. Don't wait until you're halfway through the semester.

2. Not Getting of Reading the Text.

Textbook and lab manual are NOT optional items in the chemistry class. Even if the lectures are fantastic, you'll need the text to do the homework assignments. The best way to understand the lectures is to read the chapter before coming to each lecture. Some or many of you may come to the lab without reading the experiment that you've been assigned to do. That will be a big mistake because you'll be doing the experiment without actually understanding it and you'll missed the entire concept of the experiment.

3. Procrastination

If you intend to pass and do well in chemistry you MUST study the lecture materials and do the homework promptly. NEVER put off studying and doing the homework assignment until you are halfway through the semester. It will be too late and you will never catch up. If you miss the basics, you'll get yourself into trouble. To master chemistry you must understand the concept. This requires that you study and do the homework on a daily basis. Build the concept a little at a time. Set aside a small segment of time each day for chemistry. It will help you gain a long-term mastery. Do not cram at the last minute.

4. Not Doing Your Own Work

Homework assignments are helpful if you do the exercises yourself. Study guides and solution manuals are useful only if you use them for help or for checking your work, but not as an easy way to get your homework done. Don't let a book or someone else do your work for you. They won't be available during the tests, which will account for a big portion of your grade.

5. Psyching Yourself Out

You must have a positive attitude toward chemistry. If you truly believe you will fail you may be setting yourself up for a self-fulfilling prophecy. If you have prepared yourself for the class, you must feel confident (but not over confident) that you will succeed.

Berkeley City College
Chem 1B, Fall 2017
Student's Academic Survey

Name: _____

Phone No. _____ *Email:_____
(write clearly)

1. What is your academic major or career goal?

2. When and where did you take Chemistry 1A (or its equivalents)?

3. What is your academic load this semester (in number of units)? _____units

4. What is your workload (nonacademic) in hours per week? _____hrs/wk

5. Which learning styles apply to you? (Select all that applies)

   (a) Visual
   (b) Auditory or Verbal
   (c) Visual and Verbal
   (d) Tactile/Kinestatic (or hands on)

6. Rank the following topics discussed in Chem 1A from 1 to 5 (1 = very easy and 5 = most difficult).

(a) Atomic Structure and Periodic Properties;	(1	2	3	4	5	);	(circle one)
(b) Bonding Theories and Molecular Structures;	(1	2	3	4	5	);	,,
(c) Properties of Gases, Liquids, and Solids;	(1	2	3	4	5	);	,,
(d) Mole Relationships and Stoichiometry;	(1	2	3	4	5	);	,,
(e) Solution Properties and Compositions;	(1	2	3	4	5	);	,,
(f) Thermochemistry and Enthalpy of Reaction;	(1	2	3	4	5	);	,,

7. What are you major concerns in this class?

8. Is there anything about you that I should know, such as special learning needs & accommodation? (Any personal information given to me will be treated as confidential.)