The University of Texas at El Paso
Department of Chemistry
Physical Chemistry Laboratory

CHEM 3151 Fall Term, 2017

Instructor: Dino Villagrán, Ph. D.
CCSB 2.0402
Ext. 8750
Teaching assistants: Ivan Cervantes, Nancy Rodriguez (Office CCSB 2.0418; Lab CCSB 2.0518)
iacervantes5@miners.utep.edu; nrodriguez14@utep.edu
T.A. Phone Number at Lab (915-747-7377)

Prelab meetings will be held on Wednesdays 1:30 – 2:20 pm in LART 206. For questions about the laboratory experiments and report guidelines talk to the T.A.s Ivan Cervantes, and Nancy Rodriguez, their office hours will be Tuesdays from 3:00 –4:00 pm (IC) and Thursday (3:00 – 4:00 pm, NR)).

Course Description

The objective of this course is to present and perform complementary experimental work to the Physical Chemistry course CHEM 3551 that focuses mainly in kinetics and thermodynamics from a chemical standpoint.

Textbook:

No textbook will be required. Appropriate handouts will be provided for every experiment. All of these handouts will be emailed to your utep e-mail account by the TA at least one week before the practice.

Grading:

The grade for this course will consist on the cumulative points obtained by individual experiment report averaged by the number of experiments in the course plus the result of quizzes administered previous to the laboratory practice. The grade distribution will be:

- 60% Lab Reports
- 20% Pre-lab quizzes
- 10% Performance in laboratory practice
- 10% Laboratory notebook

"Laboratory performance" includes attendance, successful execution of the experiment, and proper safety behavior.

Laboratory notebooks will be required and will be quickly graded before the practice. In these notebooks, the students shall write a summary of the experiment to be performed. The students will need to state the purpose of the laboratory practice (it can be in the form of a hypothesis). Students shall also list the required materials they will need throughout the practice and the proper procedure to be followed. The laboratory notebook shall be shown to the TA or instructor at the beginning of every laboratory practice and a grade of 0, 1 or 2 will be given (0 for unacceptable procedures, 1 for acceptable but limited discussions, and 2 for satisfactory work). Students who are not well prepared will not be allowed to perform the experiment that week, and will have their grades affected.

Reports are due one week after the completion of the laboratory practice.

Reports must be submitted in hard copy (no electronic versions) and **stapled** at the beginning of laboratory section.

Late reports may be accepted with a penalty of 20% per late day. If the report is not submitted at the beginning of the lab the report will be considered late. Late reports should be hand delivered to the T.A. or the instructor at their appropriate offices. It is your responsibility to make sure that the report was received.

Laboratory report format

The format of the experimental reports must follow the ACS style that can be found in any journal of the American Chemical Society. The format of JACS, Physical Chemistry A or Physical Chemistry B is recommended. Each individual report will be graded on the basis of the quality of the following sections:

1) Abstract: An abstract is a **brief and concise** summary of the experiment described in the report. It should include the general idea of the experiment, results obtained, and the conclusions drawn from those results.

2) Introduction: This section includes the background to the experiment. It must include the necessary theoretical framework required to understand the experimental work, and it must end with a clear statement of what will be investigated during the experimental practice.

3) Experimental Information. This section can be separated in two parts. a) A clear description of the experimental apparatuses, chemicals, or specialized computational programs utilized, and b) The exact experimental procedure followed during the practice. This section should be written in the "past tense", since this is a report of what was observed.

4) Results and discussion. A clear description of the results and any observations recorded during the experiment. Discussion of these results and how do they fit into the whole theoretical background discussed in the Introduction part.

5) Conclusion. This includes conclusions drawn from the experiment.

6) References. These should conform to the ACS style. Please refer to any JACS, Physical Chemistry A or Physical Chemistry B journals for further information. These journals can be accessed through any UTEP connection (including VPN connections from home) at http://pubs.acs.org.

Syllabus.

The following are the expected experiments we will perform this semester. Each experiment will have a timeframe of at least two weeks.

1. Literature search: Scifinder, Web of Knowledge and other library resources.
2. Densities of binary liquid mixtures: Partial molar volume
3. Kinetics: Iodine clock reaction.
4. Thermochemistry: Heats of combustion
5. Phase equilibria: Binary liquid phase diagrams
6. Water oxidation: Electrochemistry and photochemistry.

We will have to accommodate the dates for some experiment due to the limited number of instruments available (specifically experiments 4 and 5). We schedule two different experiments per week. This means that the TA and instructor will be focusing on several things at the same time. Therefore, you must come well prepared to the laboratory practice to avoid wasting time. Students who are not well prepared will not be allowed to perform the experiment that week, and will have their grades affected.

Disability If you believe you may qualify for special accommodations due to disability contact the Disabled Student Services Office: http://sa.utep.edu/dsso; 915-747-5148.

Safety A separate safety instruction sheet will be provided. Students will be required to follow these laboratory rules at all times. Use of appropriate eyewear protection compliant to university rules is mandatory at all times during laboratory practice.

Course Withdrawal Policy Classes dropped prior to the official census date (9/13/2017) will be deleted from the student's semester record. After this date, the University permits any student to drop with an automatic "W"

until **11/3/2017**. After this date, and per College of Science policy, students who withdraw must receive grades of "F".

Other considerations

Please turn your cell phones off and keep them away during lectures.

Schedule

Week		Section	Title of the Experiment	Associated Instruments	Chemicals	Brief Description
1.	9/4		Introduction; Safety Training;	NA	NA	
2.	9/11 Quiz #1	11714, 13136, 18836	Literature Search	NA	NA	Learning how to utilize Library resources, and electronic research utilities: SciFinder, Web of Science, Google Scholar. Assignment of five different topics of relevance to Physical Chemistry: Quantum dots, PCET, Water oxidation, Graphene oxide materials, Organic Photovoltaics
3.	9/18 Quiz #2 Report 1 due	11714, 13136, 18836	Densities of binary liquid mixtures: Partial molar volume	Pycnometer	NaCl and Water solutions	Learning thermodynamic concepts. Intensive and extensive properties, and calculating partial molar volumes out of density measurements of solutions composed of solid-liquid and liquid-liquid mixtures.
4.	9/25				EtOH and Water solutions	
5.	10/2 Quiz #3 Report 2 due	11714, 13136, 18836	Iodine clock reaction	NA	KI, $Na_2S_3O_3$, KNO_3, HCl, Starch, $K_2S_2O_8$	Kinetics of the iodine clock reaction
6.	10/09 (2-a-day labs) Quiz #4 Report 3 due	11714, 13136,	Thermochemistry: Heats of combustion (Groups 1-4)	Bomb Calorimeter	Naphtalene Benzoic acid, unknowns	We will study the heats of combustion of several organic substances.
7.	10/16					
6.	10/09 (2-a-day labs) Quiz #4 Report 3 due	18836	Determination of the phase diagram for a three component partially miscible system (Groups 5-8)	Buret Tritration/ Refractometer	Water, 2-propanol, benzene	We will build a ternary mixture system and produce a 3-component phase diagram. While measuring the refractive index we will obtain the composition of a two-phase mixture and measure the critical point.
7.	10/16					
8.	10/23 (2-a-day labs) Quiz #5 Report 4 due	18836	Thermochemistry: Heats of combustion (Groups 5-8)	Bomb Calorimeter	Naphtalene ,Benzoic acid, unknowns	We will study the heats of combustion of several organic substances.
9.	11/06					
8.	10/23 (2-a-day labs) Quiz #5 Report 4 due	11714, 13136	Determination of the phase diagram for a three component partially miscible system (Groups 1-4)	Buret Tritration/ Refractometer	Water, 2-propanol, benzene	We will build a ternary mixture system and produce a 3-component phase diagram. While measuring the refractive index we will obtain the composition of a two-phase mixture and measure the critical point.
9.	11/06					
10.	11/13 Quiz #6	18836 , 13136	Water oxidation	Potentiostat/	Water, ITO, $CoCl_2$,	Measurement of the thermodynamic potentials for water oxidation.

	Report 5 due			Photo-potentiostat	Phosphate buffers	
11.	11/20	11714				
12.	11/20		Thanksgiving			
13.	11/27	All	Continuation of water oxidation.			