Laboratory Outline / Schedule –Phys Chem 235A / Analytical Phys Chem 339 F *2017* *Bozzelli*

I. Instructions for different Lab Expts are on Moodle. Students should bring hard copy of lab procedure to class.

II. Students need to use lab notebook pages for recording data –in duplicate of records ("copy Tear Sheet"). A Dated & Signed (by instructor) Notebook Page (copy). Lab pages, with the data need to be handed in with each Report for Grading.

III. Reports due as scheduled on Expt sheet. Reports later than scheduled due date lose 15% of grade.
Reports later than 2 weeks after scheduled due date lose 25% of available pts.

IV. Experiment ID (In Reports, please refer to experiments by Name rather than by number).

There are 3 Preliminary Experiments (60 – 100) Points Each – Experiments - (IR) Individual Reports)

(i.) THERM Thermochemical parameters Enthalpy Entropy Heat Capacity (T) / Intro to Group Additivity. (IR)

(ii.) Volume / Mass Measurements and Required Statistical Analysis of Error - 95% Confidence limits. (IR)

(iii.) Standard Working Curve – Make Three Accurately Known Concs., Measure Abs'n, Plot Curve – Measure unknown (IR)
Measure Absorption at Target Wavelength, Plot data, Use plot to determine unknown .

There are 7 Phys/Anal-Chem Experiments -> Group Experiment (100 points / Expt)

Experiment (ID) Group of 2 students Group Experiments [(Group Report GR) (Individual Report IR)]

Titration 12 Potentiometric Titration of an acid mixture IR

Co-Ni Analysis 13 Spectrophotometry of a Two Component Mixture [with overlap of absorbance curves] GR

CC (1) Combustion (Bomb) Calorimetry (Samples: two runs each: Solid, Liquid, Food) (GR)

SC (2) Solution Calorimetry (GR)

Vp Vap (3) Vapor Pressure - Two Liquids vs. Temperature; Enthalpy of Vaporization Entropy Vaporization (IR)

K-Cat Na(OO)HCO3 Catalyst Kinetics 4 on Organic Pollutant Degradation in Wastewaters by
Supported Metal Catalyst / Sodium Percarbonate (Tooth Whitener). (GR)

K-Cat H2O2 (4b) Catalysis Kinetics -Substitute Bicarbonate Activated Hydrogen Peroxide for Sodium Per- Carbonate.

MR 5 Acid Dissociation Constant Detetermine Methyl Red Dissoc Const pKa (GR)

SL 6 Phase Diagram of a Binary Solid-Liquid System (GR)

Kin-Ls Kinetics –7 Oxidation of Dyes by Hypochlorous acid (HOCl, Bleach) Laser Absorption (GR)

KA 8 Kinetics: Hydrolysis of Methyl Acetate (GR)

KBr 9 Kinetics: Bromination of Acetone (GR)

Hv 10 Photochemical Cell: Construct & Test of Dye Solar Cell + Test The Lab Silicon Solar Cel l (Light to Energy) (IR)

Ec 11 Conductance of Strong and Weak Electrolytes (GR)

Liq-Vap LV 11b Liquid / Vapor Phase Diagram (GR)

CO2 Calibrate a Flow Meter / Measurement of CO_2 in Ambient Air (IR)

Common Experiments Chem 339 100 pts each (Group Experiments)

Pb 14 Analysis of Lead Pb, in air pollution (particulate) sample of soils (GR) (note Waiting for the lamp)

Rct Cp Joule/Sec Reactor Heat Capacity / Power Output of Microwave (Joules / Sec)

TK ThermoChemical Kinetics 15 Computational Thermochemistry and Kinetics (Individual – Expt & (IR))
Kinetics via Conductivity - not currently available

V. Chem 235A and Chem. 339 Group Assignments and Schedule Spring – 2017 *Bozzelli*

Week #s	Lab Dates locker #	Group 1	Group 2	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8	Group 9	Group 10	Dates Hard copies of Lab Report(s) Due Fridays 1.5 weeks following Completion of Expt. Submit In Lab class or in Chem Office 151 T (Bozzelli – mail bin)
		EXPERIMENTS Groups Typically have 3 weeks for set of Two Expts										
1	**Sept** 8	All Groups – Check-in, Preliminary Experiments (i.) (ii.) and (iii.)										
2-3	15-22	Expt. –Mix Acid Titration 1.5 weeks | |vap								CC	CC	Expts (iii) Std Curve, (ii) Drop Vol + Error
3 -4	22-29	Expt 13 Co-Ni 1.5 weeks | | |Co Ni								Vap	KinLs	Expts – (i) Therm / Titrate
5-6	**Oct** 6 -13	CC	Kin Ls	Liq Vap	Vp	CC	Kcat	MR	Kin cat	SC	Vap	Experiment Co-NI
6-7	13-20	Vp	CC	Hv	K-LS	Kcat	CC	CC	SC	Hv	MR	Week 6-7 Experiment
8-9	27 -3 **Nov**	K-Cat	Vap	**CC**	CC	MR	Vap	Liq vap	Hv	Kin-Ls	Hv	Week 8-9 Experiment
9 - 11	3 - 10 - 17	CO_2 Measure in Air – 1 collection set – 2 Analysis Methods . Heat Capacity of Reactor - Energy Flux from Power Source										Week 10 Experiment
012	17 **Dec** 1	Expt 15 Computational Chemistry 'Thermochemistry, -Equilibria – Kinetics - Reactor Evaluation // Make Up										Week 12 Experiment
13-14	8 15	Oral Presentation of one Experiment. (If presentation is last experiment, you can submit ppt file in place of written report)										Computational Chemical Kinetics
15		Oral Presentations Continue if Needed										**Presentation Materials (ppts) due with presentation**

VI. Total: 3 First Lab Expts 5 (1.5 week expts) + 2 (1 week expts) + 1 Thermo/Computational Chem.
Selection of experiments is determined by availability of equipment.
*** **Groups of Three need to Perform 1.5 times the Number of Runs (Each Expt) that Groups of Two do.**

VII. Reports:

- **Preliminary Experiments (i), (ii), (iii), Individual Reports (Outline format – Short Report + Graph)**
- **Experiments 1-14, on Group II Expts (Formal Report Per "Lab Report Info" on Moodle)**
- **Experiment 15, Individual / Calculations, Calculation Results / Recommendations.**
- **Reports (Abstract, Objective, Method, Data, Results, Discussion, Error Analysis, Summary.**
- **Oral Presentation on one of experiments after Mixed Acid - If Recent Expt => PPT Serves as Report.**

VIII. LAB REPORT GRADING

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SECTION	MAX SCORE
Abstract Approx ¼ - ½ page include major results here	**required***
Introduction / Objective	**required**
Experimental Procedure	**required***
Theory	**required**
Results – Experimental Data	**required***
Results – Calculation / Interpretation data	**required***
Discussion - reasons for error can be here.	**required**
Error Analysis, this a calc, not a discussion	**required***
Summary with results	**required**
Lab Notebook sheets with report write up. Signed / Dated by Instructor	**required**
Hard copy of Lab Expt Instructions in lab.	**5 pts**
TOTAL points (* Important)	**100**

Grading - 50 % for doing the Experiment Correctly - 50 % for Work up of Data / Interpretation.
Students who miss One Lab out of a two Lab Expt. will receive 25 points max for Experiment Part; Unless they make up the Expt. Part - This is an Experiment Oriented lab Course.

Chem 339 and Chem 235A

Oral presentations are a required component of this lab course. Individual or Student group / all students.

The Oral Presentation can be on any lab experiment after the Mixed Acid Titration.

If one of the Last Two labs is presented: – the PPT presentation and grade serves as the lab report - no further report due; but a copy of the PPT file needs to be submitted (hard copy or email).

Note in the thermochemical kinetics, each student has a different molecule.

If the oral presentation is on one of the other earlier experiments then a lab report is due for the last experiment as well as the earlier experiment.

The Oral report cannot be on one of first lab (preliminary) period experiments (std solution, # drops in milliliter - statistical analysis or group additivity for organic molecules) and cannot be on the Multi / Mixed Acid Titration expt.