CHEM 103: General Chemistry

Middlebury College

Spring 2019

– Laboratory Syllabus –

Instructor: Dr. Mary Jane Simpson, MBH 429, msimpson@middlebury.edu, 802-443-5978

Office Hours: Friday 11 am - 12:30 pm and by appointment in MBH 429, Open Lab Study Hall: Tuesday 9:30 am - 11 am in MBH 563

I. Schedule

Date	Name of experiment	Due date	Value
Feb. 11 - 14, 2019	Check in, lab safety, Lab 1: The discovery of eka-silicon	Feb. 18 - 21, 2019	8 points
Feb. 18 - 21, 2019	Lab 2: Separation of a mixture	Feb. 25 - 28, 2019	10 points
Feb. 25 - 28, 2019	Lab 3: Spectrophotometric determination of iron	March 4 - 7, 2019	12 points
March 4 - 7, 2019	Lab 4: Deduction of an empirical formula	March 11 - 14, 2019	15 points
March 11 - 14, 2019	Lab 5: The law of multiple proportions	March 18 - 21, 2019	15 points
March 18 - 21, 2019	Lab 6: Emission of light and tie dye	April 1 - 4, 2019	15 points
April 1 - 4, 2019	Lab 7: Sunscreen: absorption of UV light	April 8 - 11, 2019	15 points
April 8 - 11, 2019	Lab 8: Titration of citric acid	April 15 - 18, 2019	15 points
April 15 - 18, 2019	Lab 9: Identification of an unknown volatile liquid		
April 22 - 25, 2019	Continue Lab 9	April 29 - May 2, 2019	30 points
April 29 - May 2, 2019	Lab 10: Enthalpy of dissolution	May 6 - 9, 2019	10 points
May 6 - 9, 2019	Liquid nitrogen ice cream and check out	May 6 - 9, 2019	

II. Learning Outcomes

1. Find and interpret chemical safety information, and then demonstrate safe handling of chemicals in the laboratory;
2. Select appropriate measurement tools based on required precision and practical constraints, and apply significant figure rules to chemical calculations based on experimental data;
3. Propose and execute the preparation of aqueous solutions, and calculate the concentration of the solution with appropriate significant figures;
    a. Solutions will be prepared from solids and from stock solutions;
    b. Waste will be minimized;
    c. Procedures will incorporate quantitative transfer when appropriate;
4. Use dimensional analysis to solve quantum mechanics problems, such as those involving the Rydberg formula, and stoichiometry problems, particularly those relating to titrations, calorimetry, and reaction yield;
5. Construct a calibration curve with data analysis software and use it for quantitative chemical analysis, including experiments based on Beer's law;
6. Draw Lewis structures, molecular geometry and shapes, and molecular orbital diagrams, and estimate properties of molecules using both chemical principles and chemical modeling software (Chem3D);
7. Collect experimental data accurately, and organize experimental data in well-formed tables and graphs;
8. Integrate principles of general chemistry into brief explanations of experimental results;
9. Analyze specific sources of random and systematic experimental error, and revise a procedure to eliminate specific sources of error.

III. Format and Procedures

Supplies: The lab manual and worksheets will be provided online and in print, respectively at http://sites.middlebury.edu/chem103lab/. You need a pair of safety glasses. For the week of March 18, you will need a clean 100% cotton white garment if you would like to tie dye.

Safety: Everyone is responsible for maintaining a safe laboratory. Follow the safety rules at all times. Failure to follow lab safety rules will result in a significant participation grade penalty, which may be assigned without warning.

Grading: The lab counts as 25% of your final grade in CHEM 103. Grades are on a numerical scale out of 150 possible points. Points are awarded based on lab preparation and participation (5 points total), and lab worksheets (10 labs at 8 - 30 points each). *Late assignments will lose up to 1 point per day unless an extension is granted by the instructor (typically no more than once per student). Unexcused late assignments received after an answer key has been released (typically one week after the assignment was returned) will receive no credit.*

Corrections: Students who receive a 70% or below have the option to correct and resubmit a lab report for partial credit. Corrections are due a week after the assignment was returned, with corrections no longer accepted after an answer key has been released. Students considering correcting and resubmitting are encouraged to meet one-on-one with the instructor or a TA.

Attendance: Attendance is required in order to perform experiments and complete lab reports. Please arrive on time; pre-lab discussions are brief and provide critical information. *If you miss a lab, you must make it up promptly, ideally joining another lab section. Excused absences are eligible to receive full credit, but unexcused absences automatically lose 25%.*

Preparation: *Read through the lab handout and complete the pre-lab portion of the lab worksheet* prior to arriving to lab. Your pre-lab assignment will be checked at the beginning of lab, but you can correct it during the pre-lab discussion. Plan on preparation taking approximately 1 hour each week.

IV. Academic Integrity

Academic integrity is of utmost importance in chemistry lab: you must never falsify your data. You are encouraged to work together in and out of lab and to discuss your lab reports with other students, however, the assignments you turn in should represent your own work, in your own words, based on your own original data. If you use resources other than your textbook and online lab manual, then you must cite your sources appropriately. Each student in this course is expected to abide by the Middlebury College Honor Code. Suspected violations will be reported to the Office of Judicial Affairs.

V. Accommodations for students with disabilities

Students with documented disabilities who believe that they may need accommodations in this class are encouraged to contact me as early in the semester as possible to ensure that such accommodations are implemented in a timely fashion. Assistance is available to eligible students through Student Accessibility Services. Please contact Jodi Litchfield at litchfie@middlebury.edu for more information. All discussions will remain confidential.