CHE 121: Chemical Principles I, Cornell College (Jai Shanata)

**Lab syllabus for Block 2, September 24th – October 17th, 2018**

***Please carefully read this document and keep it for reference***

**Lab Instructor**: A. Rayford Harrison

**Office:** West Science 318

**Phone:** (office) x????; (cell): Given in class (call until ~7 pm)

**Email:** [rharrison@cornellcollege.edu](mailto:jshanata@cornellcollege.edu)

(email is the best way to reach me unless you need an instant response)

**Office hours**: West Science 318: each lab day after lab, M 11:00 am – noon, and W 11:00 am – noon. I will generally be available for at least an hour after we complete each lab to help with calculations. To meet with me at other times check my office to see if I’m in or email me to make an appointment. If necessary, deviations from the listed office hours will be announced.

**When and where will we meet?**

This lab will meet from 12:30 - 3:00 PM at various times throughout the block. We will meet for a short pre-lab lecture in WS 319 before we move to room WS 302 for lab. New labs will be handed out in lab and/or available through Moodle ([https://secure.cornellcollege.edu/moodle/login/index.php),](https://secure.cornellcollege.edu/moodle/login/index.php) in the assignments folder.

**Lab Schedule (Tentative)**

|  |  |  |  |
| --- | --- | --- | --- |
| **Day** | **Date** | **Time** | **Experiment** |
| 2  3 | Tues, Sept 25  Wed, Sept 26 | 12:30 pm  8:30 am | Exp 1: Sink or Float |
| 4 | Thurs, Sept 27 | 12:30 pm | Exp 2: Running Out (Lab report due 10/4; rewrite due 10/11) |
| 5 | Fri, Sept 28 | 1:00 pm | Exp 3: Solution Puzzle Lab |
| 7 | Tues, Oct 2 | 8:30 am | Exp 4: Calorimetry Lab |
| 9 | Thurs, Oct 4 | 12:30 pm | Exp 5: Why does the can implode? |
| 12 | Tues, Oct 9 | 8:30 am  12:30 pm | Exp 6: How Can We Explain Atomic Line Spectra? |
| 14 | Thurs., Oct 11 | TBD | Exp: 7 Are Molecules 3D? |
| 15 | Fri., Oct 12 | 8:30 am  12:30 pm | Exp: 8 Can Non-metals Be Magnetic? (Lab report due 10/16) |
| 16 | Mon, Oct 16 | 12:30 pm | Exp 9: Intermolecular Forces and Functional Groups |

**How will our work be graded?**

The points for the laboratory portion of this course will be assigned **approximately** as follows.

|  |  |  |  |
| --- | --- | --- | --- |
| **Daily Assignments** | | | |
|  | Points per day | Number of days | **Total Points** |
| Daily Attendance | 4 | 9 | **36** |
| Daily Safety | 2 | 9 | **18** |
| Pre- & Post-lab questions | 4 | 8 | **32** |
| Lab Notebook | 4 | 6 | **24** |
| Quizzes | 5 | 5 | **25** |
|  | | | |
| **Formal Lab Reports** | | | |
| 1st formal report | | | **10** |
| Rewrite of 1st report | | | **25** |
| 2nd formal report | | | **30** |
|  | | | |
| **TOTAL** | | | **200** |

Your overall grade for the lab portion of this course will be based on the percentage of the total points earned for all labs/assignments. [If they don’t end up totaling exactly 200 points at the end of the term, they will be scaled to 200 points when incorporated into your overall course grade by the lecture instructor.] Each experiment will be graded according to the criteria listed in the grading rubric and notebook guidelines. You cannot pass this course if you do not pass lab.

**What if something comes up?**

To receive full credit for your work, it must be turned in on time. If you have a valid excuse as to why something is late, please notify me of this reason as soon as possible; preferably before

the due date. Points will be deducted for each day late. Make-up labs will not be scheduled under ordinary circumstances. Please remember that lack of planning on your part does not constitute an emergency on mine.

**“…But we are working together in the lab. Why can’t our reports be the same?” First**

**and only warning.**

Working together on lab reports is fully acceptable; outright copying is completely unacceptable. I expect that the work you turn in is your own. I do not mind if you help each other but the assignment you hand in should be a product of your own effort. Cheating will result in a zero given for that particular assignment. We will adhere to College guidelines regarding academic dishonesty, as stated in Cornell’s student handbook, the Compass: “If an instructor judges that

a student has violated the College's policies on academic honesty, the student may be charged with academic dishonesty and assigned an F either for the particular examination, paper, report, or project, or for the course. The normal penalty for a second offense is indefinite suspension from the College.

**RULES OF THE LABORATORY**

1. Safety goggles must be worn at all times by everyone in the lab.

2. Dress appropriately for lab. This includes closed toes and top of foot shoes, at least T-shirt length sleeves, shirts long enough to cover the torso and at least knee length shorts/skirts/pants.

3. Do not bring food, beverages, or empty beverage containers into the lab and do not taste anything in the lab.

4. Never work alone in the lab and never work without the instructor's knowledge and consent.

5. Report all accidents to the lab instructor immediately, any cuts, burns, spills or other injuries.

6. Learn the location and use of the emergency equipment including the fire extinguisher, safety shower, and eye wash fountain.

7. Use only clean glassware. Never assume that glassware is clean unless you were the last person to use it and washed it.

8. Read the labels of all chemicals carefully before you use them. Use only the quantities and concentrations called for in the experiment. Look closely at the hazard labels.

9. Treat any unknown substance as hazardous.

10. Wash your hands if they come into contact with any unknown or hazardous substance. Wash your hands before you leave the lab to avoid contamination of books or food (could lead to accidental ingestion).

11. Keep your lab area clean. Pay particular attention to the area around the balances. Any amount of a spilled chemical, whether solid, liquid, or solution, must be cleaned up immediately and disposed of properly. Ask if you are unsure of the best way to clean up or dispose of a chemical.

12. Place broken glass in the buckets provided for that purpose, not in the regular trashcans.

13. Use a fume hood whenever toxic or irritating gases are likely to be evolved. Never directly inhale vapors.

14. Never pour water into concentrated acid. Always pour the acid slowly into the water while stirring the mixture constantly.

15. Before lighting a flame make sure that there are not any highly flammable substances open in the lab.

16. Never heat mixtures in graduated cylinders. When you are heating a test tube, always point the mouth of the test tube away from yourself and others.

17. Do not contaminate the reagent bottles. Pour some of the reagent into a beaker for your own use when necessary. Do not pour the excess back into the bottle. Do not use a dropper to remove a solution from a reagent bottle unless the dropper is provided with the bottle.

18. Do not remove any chemicals from the lab.

19. Do not perform unauthorized experiments.

20. Inform the lab instructor if you have any medical conditions or learning disabilities that might affect or be affected by your performance in lab.

**Ask questions!!!!!!!**

**Checklist of what to include in the Lab Notebook**

Lab notebook pages: All lab pages should be consecutively numbered

All writing must be legible

Use only blue or black ink

No white-out, use single line cross-outs for any errors

Write a balanced chemical equation for any reaction

Title of the experiment: Begin the notebook entry by writing the title, date, and the names of your lab partners at the top of a page.

Pre-lab questions: Provide answers to the prelab questions

Materials: Provide a list of all materials used in the experiments.

Procedure: Write your procedure as you do the experiment. Be sure to include when/how long procedures took. Use passive past tense sentence structure. For example: 3.0 mL of 5 M HCl was poured into 250 mL of water with stirring.

Observations: Record what your senses tell you. Observations can be brief statements (“solution turned orange”) but need to include enough detail to be useful when completing the worksheet/report. Start with recording the appearance of the starting materials before the reaction then go on to record any initial appearance of all solids, solvents, and solutions; color changes; physical changes, etc.

Data: Record data in your tables with headings including the units of measurement and the same number of significant figures as were actually measured.

Graphs or spectra: Attach graphs or spectra to a notebook page with four pieces of tape. Do not cover other work. Label on the graph any information obtained from the graph. Be sure to include a title, axes labels and units, and a legend if necessary. Graph must be an appropriate size and preferably made in Excel. A second copy of the graph may be needed for inclusion in a lab report. Not all experiments will have graphs or spectra.

Calculations: Calculations for the experiment may be done in the notebook. A sample calculation for each relevant variable will need to be included in your worksheet/report. Written calculations should be clearly labeled retaining units for each variable. Avoid rounding error by recording two extra *insignificant* figures until the final result of the calculation is reported. Round the final results to the correct number of significant figures. When the same calculation is performed more than once, report the results in a table.

Results: A table or summary of results may be included in the lab notebook. You may want to add some notes that will help you with writing the report. Were there any mistakes made or other possible sources of error? Do you have any ideas that would make the lab go more smoothly or the results more reliable? A formal statement of the results needs to be included in your report.

Post-lab questions: Provide answers to the post-lab questions. You do not need to answer the “thinking about the data” questions for we will typically discuss these questions during the lab period.

**General Laboratory Report Format**

1) General Format: The main text body of the report should be typed, 1.5 or double-spaced, using either **10 point Arial** or **11 point Times New Roman** fonts or the equivalent.

2) For ease of grading and analyses, clear summary data tables should be inserted in main body of the report after the text that first references the table. Figures and graphs may be inserted in the text next to where they are first referenced or placed at the end of the report immediately after the references. All figures/graphs and tables must be numbered (1, 2, etc.) and include a brief descriptive title or caption. Clearly label the following sections in this order:

1. **Cover page** (5%): **Title (**you can make up your own title for the experiment) and your **name**, your **partner’s name** (lab partner), and an **Abstract** (< 250 words): Describe your basic synthetic approach, key results, and summary of the major outcomes and discoveries from your experimentation.

b) **Introduction** (15%): This will include a brief and focused background on the systems you are studying and techniques used. Do not just copy information from our lab procedures. You will find relevant info in the references on handouts, lab procedures, textbooks, and any other professional sources.

c) **Experimental Procedures** (25%): In this section you will describe the **actual steps** (and amounts, grams and moles!) you used to synthesize and isolate your products. In some cases, what you did was different than the lab procedures, so do not just copy of information in the lab procedures. List the instrumental apparatus and sample preparation used for each analysis (e.g., IR with a Nicolet FT-IR on KBr pellets containing ~x% sample).

d) **Results** (35%): This is the part where you detail the results of your experimental procedures and product characterization. Whenever possible, utilize tables to organize your numerical data on different compounds (e.g., mass yield, % yield, UV absorption maxima, IR, etc.). Any known errors in measurements should be stated here. Sheets of calculations (hand calculated or Excel) will be attached as an Appendix at the end of the report.

e) **Discussion** (20%): This is the point where you will look back at your results and draw conclusions. This could include hypotheses about chemical structure, product purity, electronic configurations, and magnetism. Do **not**just restate experimental results in this section. If a mishap, error, or other anomaly occurred, report it *as well as* how it impacted your data, and what consequences it may have for your final calculations, product, etc. (you may be asked to expand on this in a lab worksheet or discussion). The last paragraph of this section will be a brief overall summary/conclusion.

f) **Figures** (if not inserted in the text) – such as hard copies that are annotated as necessary (included in grading for Results section). Each figure should include a figure number and short captions.