

Lab Reports – CHE 371

The lab reports for this course will be written in journal format. I encourage you to read, or browse, articles from the Journal of Physical Chemistry (A, B, or C) to familiarize yourself with the formatting of this journal. Note that every article includes an information section (title, author name, author location/contact information, etc), an abstract, an introduction, an experimental methods (or theory and calculations) section, a results and discussion section, conclusions, and references. Choose an article and pick out the key pieces of information included in each section. To help, I've outlined what I feel to be important in the discussion below.

Overall, your lab reports must be clearly written and well organized, include little or no grammatical or spelling mistakes, and have consistent titling of graphs, figures, and tables. You do not need to use columns, but line numbers should be included (in Word, use the Layout tab in the Page Setup to add line numbers). Any symbols used should be defined, and the correct Greek/mathematical symbols must be used (e.g., use 'α' not 'a' or 'alpha'). Superscripts and subscripts should be used appropriately (e.g., 6.022×10^{23}).

Lab reports will be submitted to me electronically – either by e-mail or on Moodle (watch for further instructions in lab). Late reports will incur a large penalty (5% of available points *per day*). Submitted reports will be handled by me and sent to your classmates for anonymous peer-review. Final grades will be determined by me, with influence from the comments made by your peers.

REPORT SECTIONS:

Title Page: This section should include: (1) Experiment Title, (2) author's name, (3) author's address (the name and address of the institution where work was completed, (4) author's e-mail address, (5) date submitted, and (6) lab partner(s)' name(s).

Abstract: An abstract is a comprehensive summary of the work presented in the paper. A reader should be able to extract all of the vital information of the paper: the experimental objectives, how these objectives were attained, and the results from the abstract without having to read the entire article. The abstract should also contain a concluding sentence or two outlining how the results satisfy the objectives. If applicable, include comparison with other literature values.

Introduction: The introduction section of the paper outlines the objectives and motivation for the project. It also provides a summary of any background material, including any theories/calculations used, and any relevant references in the literature. The introduction should answer the questions: What are you going to do? and Why are you going to do it?

Experimental/Computational Methods: This section should provide a detailed procedure for the experiment, such that a reader (who is a capable scientist) could potentially repeat the experiment and verify the results. It **SHOULD** include: the amounts and concentrations of any chemicals used, the names of the companies the chemicals

were purchased from (look on the bottles), a description of how samples were prepared, the name of any instrument or software that was used, and the parameters and settings used on any instrument. If a pre-made sample was used, indicate how the sample was provided and contained. This section **SHOULD NOT** include: step-by-step instructions! Presume that the readers are familiar with basic lab techniques and are capable of learning to use any instrument or software on their own. What readers need are the details that are specific to your experiment, such as chemical concentrations and spectral parameters.

Results and Discussion: The data and results should be presented to the correct significant figures with estimated errors and correct units in the **TEXT** of the section. When the results include calculations, relevant equations, results and the statistics of linear-regression analysis should be included. The written report is complemented by plots, charts, tables, and spectra. These figures should appear in consecutive order as they are referred to in the text. All figures should have captions (text boxes) that describe the figure and provide relevant information. All plots and spectra should be prepared in Excel (or another plotting program) and should have a title, x-axis label, and y-axis label. Trendlines can be included on plots to represent the results of a linear-regression analysis.

This section should include an analysis of the error in the experiment. Quantitative errors on reported values should be provided, where applicable. Only sources of error which are significant enough to impact the results of the experiment should be included. If there is a systematic error in the results, describe what caused it and how the results are affected by it. If calculated values disagree with literature values, do NOT assume that experimental error is to blame. Assume, FIRST, that the error is in the data analysis/calculations. If these errors are ruled out, then consider experimental error.

After presenting the results, the significance of the results should be discussed. This part of the section should communicate to the reader how the results satisfy the objectives or how they failed to satisfy them. An explanation of why (or how) the experiment (in whole or part) succeeded or failed should be included. Any Discussion Questions provided during lab should also be answered here.

Conclusion: This section summarizes the results (including numerical values and errors) and gives any conclusions. Often, this section includes comparisons to any relevant literature values.

References: Important sources of information must be referenced, including websites. References should be listed and numbered in the order in which they appear in the text. Endnote or RefWorks can make the task of keeping track of references easier, but they do not need to be used. The correct position for a citation in the text is at the end of the last sentence of material being cited (or for equations, at the end of the sentence immediately preceding the equation). The reference number should appear either as a superscript following the final punctuation or in square brackets (“[]”) preceding the final punctuation. The format used for references is that found in J. Phys. Chem. (A, B, or C). (Note: Endnote and Reworks will also automatically format references.)

The ACS Style Guide, available at the library, is a good source for formatting and examples. Below are a few select examples. If you use a source type not listed here, first consult the ACS Style Guide. If questions remain, please see me.

Book Section:

First Author Last Name, First Author First Initial, First Author Second Initial; Next Author, etc. Chapter Title. In *Book Title*; First Editor Last Name, First Editor First Initial, First Editor Middle Initial, Next Author, etc., Eds.; Publisher; Location, Year, pp. Page #.

Example: Formosinho, S. J. Understanding Chemical Reactivity Through the Intersecting-State Model. In *Theoretical and Computational Models for Organic Chemistry*; Formosinho, S. J., Csizmadia, I. G., Arnaut, L. G., Eds.; NATO ASI; Kluwer: Dordrecht, The Netherlands, 1991; pp 159.

Book:

First Author Last Name, First Author First Initial, First Author Second Initial; Next Author; Etc. *Book Title*; Publisher: Location, Year.

Example: Arnaut, L. G.; Formosinho, S. J.; Burrows, H. D. *Chemical Kinetics*; Elsevier: Amsterdam, 2007.

Journal Articles:

First Author Last Name, First Author First Initial, First Author Middle Initial.; next author, etc. *Journal Name*, **Year**, *Volume(Issue)*, Page #s.

Note: Journal names should be in abbreviated form. See ACS Style Guide for list of journal.

Example: Hua, I.; Kang, N.; Jafvert, C.; Fabrega-Duque, J. *Environ. Tox. Chem.* **2003**, *22(4)*, 798.