

CHEG 3128 – Chemical Engineering Junior Laboratory

Heat & Mass Transfer Deliverables

e-Poster Guidelines and Rubric

The e-Poster will detail the mass transfer experiment.

As groups are submitting posters electronically and will not have a poster session, the posters should be self-explanatory. Be thorough yet concise. Use the resources available to you; not only are there extensive tutorials online, but there are posters hanging in the hallways of E2 and UTEB that may be useful when designing your own poster.

Design Tips:

- Your poster should have good visual flow. Consider how someone would read your poster (left-to-right, top-to-bottom) and lay your sections out accordingly. Avoid making the viewer jump between sides of your poster.
- Avoid using too many words. Use enough words so someone can follow your poster without you being around to explain it, but no more.
- Figures and images should be easy to read and compare.
- Be aware of size and scaling. Try to keep figures about the same size to help laying things out.
- Keep design elements consistent (font, colors, layout, figure format)

Useful websites:

- <https://projects.ncsu.edu/project/posters/index.html>
- <http://www.dartmouth.edu/~ugar/undergrad/posterinstructions.html>
- <http://www.nuigalway.ie/remedi/poster/index.html>
- <http://guides.nyu.edu/posters>
- <https://ugs.utexas.edu/our/poster/samples>

e-Poster Rubric

Criteria	Outstanding	Acceptable	Unacceptable
Poster Quality (___/10)	Poster laid out well with appropriate balance of text and graphics. Text is clear and legible. Spelling/grammar on posters is flawless.	Poster is somewhat wordy or hard to read. Spelling, grammar, or usage errors that should generally be caught with careful proofreading and/or practice.	Amount of text on poster is overwhelming to audience. Text is small and hard to read. Significant spelling, grammar, or usage errors.
Graphics Quality (___/10)	Graphical elements (figures, tables, etc.) are well labeled (axes, title, caption), etc. Data are clearly distinguishable via choice of display elements. Experimental data shown as points; theory or prediction shown as lines. Error bars clearly shown.	Graphical elements (figures, tables, etc.) are present and labeled. Data may be hard to distinguish due to poor choice of visual elements. Experiment and predictions may be hard to distinguish due to poor choice of formatting. Error bars largely missing	Graphical elements may not be present, or are labeled poorly enough to be generally incomprehensible. Minimal effort expended, equivalent to simple copy-paste of a spreadsheet graph or table.
Application of Theory (___/10)	Students will correctly identify the most appropriate theory that corresponds to the experiment. Students will make appropriate predictions of experimental outcomes based on their interpretation of the theory.	Student will identify some theory that may be relevant to the experiment, but demonstrates flaws in their understanding that impact their ability to make predictions, or fails to make predictions.	Students do not attempt to create any links between experimental goals and theoretical predictions.
Statistical Significance (___/10)	Students will use their data to evaluate the statistical significance of their data, and report the calculated error with correct significant figures. Students will correctly propagate error through calculations as needed. Graphs will contain error bars where appropriate.	Students perform a cursory error analysis using their data. They may over or under report significant figures, and do not propagate error analysis through their calculations. Error bars may or may not be present.	Students do not make any attempt at error analysis.
Data Quantity (___/20)	Students plan carefully and take enough data to cover the operating space. Enough runs are done to obtain data for statistical analysis.	Students may encounter problems that restrict their data set, allowing a minimum of analysis to be performed.	Students encounter significant problems, and lack enough data to do a meaningful analysis.
Data Quality (___/20)	Students use good laboratory techniques to assure that data taken is free from as much noise and error as possible. Students minimize operator errors to try to eliminate bias.	Students' technique may be sloppy, resulting in poor agreement between some data sets that can't be attributed to equipment causes.	Data is essentially meaningless, as students are either unprepared or incapable of running the equipment effectively.
Conclusions (___/10)	Students draw appropriate conclusions from their data (if possible), tying the observed results back to predictions and theory. Reasonable attempts to explain deviations (small or large) are made.	Students draw some conclusions that may or may not be supported fully by the data. They may not tie their observed results back to original predictions. Minor attempts at explaining deviations may be made, but they do not reflect serious attempts to understand causes.	Students do not make any attempt at conclusions, or tying observed data to original predictions.
Broader Applications of Experimental Topics (___/10)	Students successfully incorporate a discussion of potential applications of the technologies relevant to the laboratory. They consult and appropriately cite external sources for some information.	Students discuss potential applications, but the examples given are largely from common knowledge or information that is provided to them through experimental documentation.	Students make no significant effort to incorporate potential applications into their report.

Technical Memo Template

The memo will detail the heat transfer experiment.

Formatting notes:

- Include page numbers, except for the cover page. The page after the cover page is page 2.
- All fonts should be the same! This includes tables and figures.
- Always specify units!!!
 - In text, units should be written out (“millimeters” instead of “mm”)
- Write in the past tense for the procedural and narrative parts of the report, as you are discussing experiments that happened in the past. When discussing theory, stating facts, or explaining figures and tables, use the present tense.
- Don’t switch between passive and active voice; be consistent
- Page Setup:
 - 1 inch margins all around
 - Line spacing should be 1.5
 - Font size should be 12 point at most; font should be Times New Roman, Arial, or Calibri
 - Section headings should be in **bold**
 - Charts or scatter plots should follow the template given, and should be standard at 6.5 inches in width, with text wrapping set to top and bottom. Paste them as picture objects and not as embedded office objects.

CHEG 3128
EXPERIMENT TITLE
AUTHOR(S)
DUE DATE

REPORT RECEIVED BY: _____ DATE: _____ TIME: _____

1.) Introduction and Background: [1 Page]

A technical memo is shorter than an official report, and is designed to convey the maximum amount of information in the shortest amount of space. In your professional life, you will write many such documents. In the case of a technical memo, you can assume that the reader already has a decent understanding of what the fundamentals of your topic are, and the introduction is serving as a specific description of what you did (**what were the objectives of your experiments**) as well as the basic procedures you employed. (**How did you carry out your experiments?**) You should include a broad description of the technical theory behind the experiment, to the extent of stating the relevant equations, defining the variables, and summarizing the theory. You do not need to include the broader context of the experiment (e.g. distillation is awesome because of x,y,z). The introduction should focus on what your objectives were and how you met them. In some circles, this is referred to as an “extended abstract”.

Example:

In this experiment we carried out a fractional distillation of Component A and Component B using the Really Big Distillation Column. The goal of this experiment was to determine the effect of varying reflux rate, feed composition, and the weather on the quality of the separation between components A and B. Reflux rates were varied between zero and a billion gallons per year. Compositions were varied between 0% and 100% of component B in 5% increments, and the weather was varied using a McFly-Brown Weather Modulator 2265 in continuous mode. Experimental data was compared both to hand calculations based on the Burkey-Anastasio method, as well as to model ASPEN data. Based on the theory, it was expected that...(etc.)

2.) Experimental Methods and Analysis: [1/2 Page – Diagram in the Appendix]

The methods section here does not need to be a detailed operator-quality instruction list for running the experiment. Take a few sentences and describe the equipment used in the experiment, the general procedure, and what type of data was obtained. This should be in paragraph form, not a list.

Example:

Distillation of components A and B was carried out in the Really Big Column. The feed consisted of X% A and (1-X)% B, and was fed at a rate of Z gallons per minute. Samples were taken at every stage, and subjected to GC analysis using a Farnsworth 2000 Gas Chromatograph. Areas of the GC peaks were calibrated using standard solutions, to which the column compositions were compared... (etc.)

3.) Results and Discussion: [1.5-2.5 Pages]

This is the main body of the report, where you discuss the major findings from your experiment. You should expand on the technical theory behind the experiment.

Data that you take will often be presented in the form of figures or tables, which you must then explain fully in the body of the text and provide your interpretation of what the data means. Figures and tables should always be accompanied by a relevant caption that summarizes the discussion of the figure's contents. Captions for figures are placed below the figure, while captions for tables are placed above the table. ALWAYS INCLUDE ERROR BARS. If your error bars are too small to be seen, mention that in the caption of the figure or in the text. If there is more than one data set in a plot, each data set should have a different shape data point (circle, triangle, etc) to differentiate.

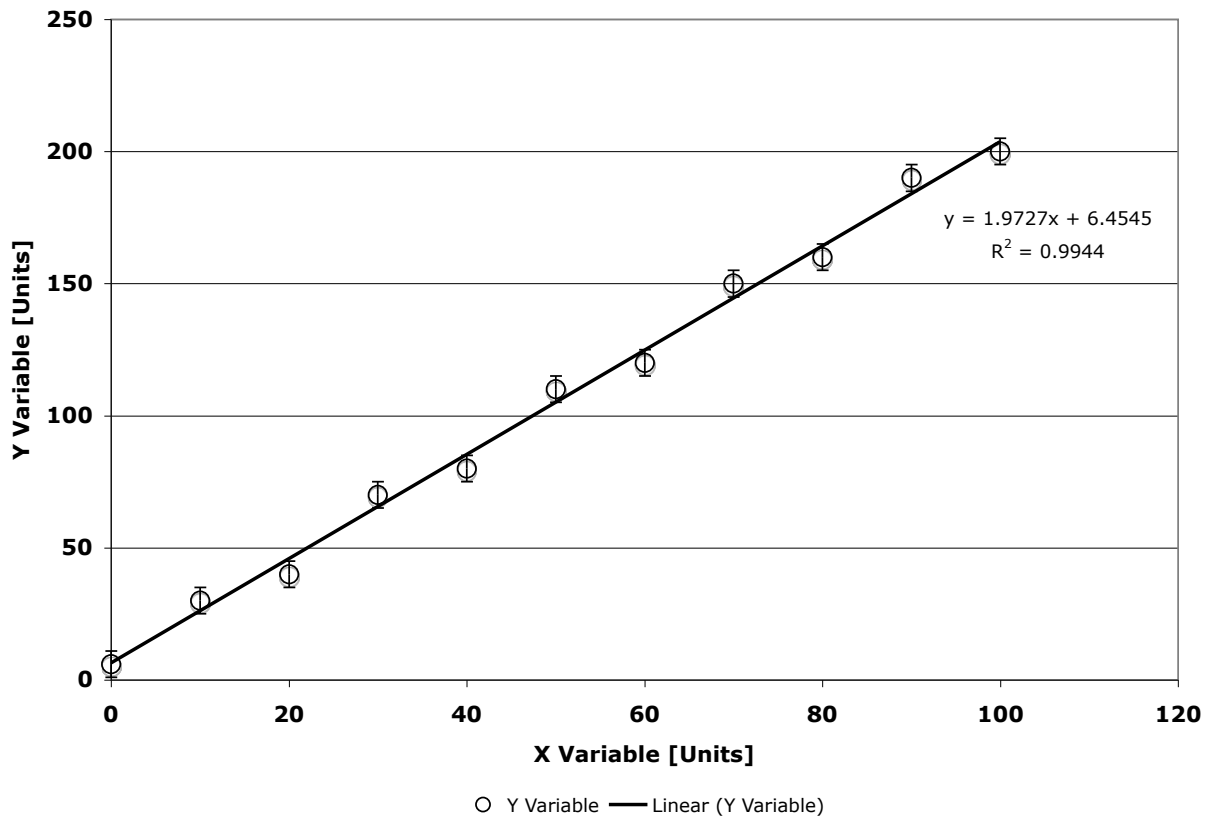


Figure 1: Y variable plotted as a function of X. Note the inclusion of a linear regression of the data, as well as the inclusion of error bars. In general avoid the use of color in graphs, in case the document is photocopied. All graphs should be 6.5 inches in width. Fonts are 12 pt, for easy readability. Figure captions can be single-spaced.

Table 1: Example of how to structure data in a table.

Column 1	Column 2	Column 3	Column 4	Column 5
[Units]	[Units]	[Units]	[Units]	[Units]
1.0	1.0	1.0	1.0	1.0
2.0	2.0	2.0	2.0	2.0
3.0	3.0	3.0	3.0	3.0
4.0	4.0	4.0	4.0	4.0
5.0	5.0	5.0	5.0	5.0

The challenge of writing a good technical memo is to learn to summarize and report your results for maximum impact in the shortest amount of space. Students are often thrilled at small page limits, but in many cases, it is more difficult to write concisely and well than it is to write a longer document and pad it with unnecessary data and meaningless sentences that don't contribute to the technical content. You will need to decide on your most relevant results, what they mean, and present that in a concise fashion. Do not try to include all of your raw data, and do not include derivations (unless you are reporting something new or novel, in which case include it in the appendix). In a technical memo, it is generally advisable to discuss the meaning or the implications of the results immediately after presenting them.

Example:

Figure X shows the effect of weather on the separation of A and B. As shown, sunny conditions resulted in 10% more A in the distillate than under rainy conditions. Foggy conditions showed the opposite trend, with 10% less A in the distillate. Based on theory, this was expected, as A is more rain-sensitive than B. (etc.)

Conclusions and Recommendations: [1 Page]

A technical memo should end with the conclusions that you have drawn regarding your experiment, in the context of what you expected per your introduction. The introduction should tell the reader what to expect, the results section should tell them what you did and what the results were, and the conclusions should tie those things together in a coherent way. Include “bigger picture” applications; discuss other systems where you could apply your finding. Recommendations here are also appropriate, and in the context of this class, should focus on potential improvements to the lab that may be of benefit to the next lab group performing the experiment.

Example:

In agreement with the theory, it was shown that sunny weather results in improved separation between A and B, showing that A is indeed impacted by the weather. To maximize separation, future groups should avoid rainy weather during their experiments. Additionally, it may be beneficial to conduct the experiment at varying ambient humidities to attempt to quantify this effect...(etc.)

Appendix: [No page limit; not counted in page limit]

As described, the appendix contains anything that is not appropriate for the main body of the report. **At a minimum**, it must contain a photocopy or scan of your original data from the experiment, the Safety Data Sheets for any chemicals your experiment involved, nomenclature, sample calculations, and any calibration curves that you generated during the course of running the experiment. Do not assume that the reader will read the appendix to find out crucial information!

Different appendices should be on separate pages. For example, Appendix A will include raw data and will be on the first page of the appendix; Appendix B will include sample calculations and will be on the page following Appendix A, etc.

References: (Not counted in page limit)

This is an extremely important section of the document. Any and all references or sources you use in the text should be listed here, in the order that they appear in the text itself. In-text references should be numbered sequentially from the beginning of the documents, and set off in bold brackets at the end of the sentence that is being referenced or as a superscript at the end of the sentence that is being referenced. As an example, the end of this sentence contains a reference. [1]

All such references would then be collected and spelled out explicitly in this, the references section of the document. You will be expected to follow the ACS style guide for the inclusion of all reference types.

<http://www.lib.berkeley.edu/CHEM/acsstyle.html>

[1] Author, A.A.; Author, B.B., *Book Title*, Edition; Publisher: Place of Publication, Year; Pagination.