Technical Writing and Structure of Lab Reports

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STRUCTURE OF LAB REPORTS

TITLE PAGE

Add the following details: Logo, Title in capital letters, institution and department, student name, student ID, group number, group members, supervisor's name, and date. Adequate spacing.

ABSTRACT (less than 200 words)

a. Abstract is a brief summary of the report and major outcomes.
b. Example: The objective of this experiment is to study … by means of … in the range… Results showed that … and compared (un)fortunately with (un) published values. It was concluded that …. Recommended ….
c. Cite no references except by author's name and only if essential.
d. One paragraph preferably less than 200 words.

TABLE OF CONTENTS

List all the main sections of the report: section number (if numbering is used), major heading, and page numbers.

INTRODUCTION (up to 1 page)

a. **Introduction** provides a general background about the scope of the report and what the reader is expected to learn from the presented work.
b. At the end of introduction, state your **Objectives** clearly: What to be done, Outline the method or approach of investigation, Indicate the expected outcomes and their importance.
c. In long formal reports, the Introduction and Objectives can be separated into two sections.

THEORY (1- 3 pages)

a. Also called Literature Review.
b. Theoretical background of the experiment: Equations and supporting references.
c. Be brief and do not use equations or theories that are irrelevant to your experiment (discuss the equations that will be used in the calculations in your report).
d. Use appendices for necessary derivation and long theoretical information.

EXPERIMENTAL PROCEDURE

a. Also called Methodology or any equivalent expression.

b. This section provides details on experiments conducted and measurements used in a logical sequence with enough details so others can follow your procedure and duplicate the work.

c. Details include: chemicals, equipment, variables, and measurement devices in the experiment. Use drawings or images of apparatus and refer to these numbered figures in the text.

d. A step-wise procedure is preferred. Use the lab manual and use it as a reference.

e. Give criteria for steady state or equilibrium.

RESULTS AND DISCUSSION

a. In this section present your findings in the simplest way possible including: tables, graphs, pie charts, bar charts, diagrams, etc. Avoid duplicating data in more than one way; e.g., tabulated or graphical data.

b. Label all figures and tables (see samples below). ***Figure title should be placed below the figure, and Table title is placed above the table***.

c. Use unified system of units (SI units are preferred).

d. Report only final analyzed results. Raw data and intermediate results not related to the experimental enquiry should be placed in the **Appendices**.

e. Include the error analysis whenever possible to evaluate the relative importance of errors.

f. Discuss the results and explain their significance, identify important issues, suggest explanations for your findings, and outline any problems encountered.

g. Explain if the results are consistent with the theoretical background while comparing your results with the similar works in references (e.g., books, journal papers, conference papers, reports, etc.)

h. In long formal reports, this section could be separated into two independent sections: "**Results**" and "**Discussion of Results**".

CONCLUSIONS & RECOMMENDATIONS (1 – 2 paragraphs)

a. The Conclusions section collects together the main points presented in the report relative to the objectives of the experiment.

b. It should be expressed clearly and should not contain any new information, discussion of results, or conclusions of anything that had not been discussed.

c. Once conclusions are made, make some recommendations to the utility of the conclusions.

d. In Recommendations, explain how useful the methodology and the results are, mention restrictions or limits pertaining to the use of the results, and recommend ways to improve future works.

e. Conclusions and recommendations may be in the form of descriptive paragraphs or running lists.

REFERENCES

a. References section provides details of all the work by other authors which has been referred to within the report.

b. Details of Reference should include: author's name, title of the publication, journal title or publisher, place of publication, page numbers, details of the journal volume in which the article has appeared, date of publication, etc.

c. References could include: books, papers, reports, websites, newspaper articles, dissertations, government publications, interviews, magazines, discussion with an expert to name a few. Try to rely on the refereed (reviewed) sources like book and papers.

d. Write the references a standard way (e.g., APA or MLA styles)

e. References should be numbered and cited (mentioned) within the text.

f. A good internet site for organizing your references: www.Citethisforme.com

APPENDICES

a. An appendix contains additional information related to the report but is not essential to the main findings. This can be checked by the reader if needed.

b. Examples: Nomenclature, Raw data, Sample of Calculations, Reference graphs or tables necessary for calculations (e.g., steam table, physical information, etc.), interview questions, statistical data, a glossary of terms, or other information which may be useful for the reader.

c. Entitle each one (Appendix A, Appendix B, etc.)

d. ***Nomenclature*** is a collection of symbols used in the report sorted alphabetically (capital before small letters; Greek symbols come at the end), define them, and give units.

TYPES OF LAB REPORTS

Reports in the Chemical Engineering laboratories are to be submitted in two types:

- **Full report**: contains all the elements of a report as described in the coming section.
- **Short report**: contains partial elements of the full report.

Elements to be included in each type are given in the table:

ELEMENT	FULL	SHORT	COMMENTS
TITLE PAGE	✓	✓	
ABSTRACT	✓	✓	
TABLE OF CONTENTS	✓	✓	
INTRODUCTION	✓	✓	In Short only Objectives
THEORY	✓		
EXPERIMENTAL PROCEDURE	✓		
RESULTS AND DISCUSSION	✓	✓	
CONCLUSIONS & RECOMMENDATIONS	✓	✓	
REFERENCES	✓	✓	In short yes if needed
APPENDICES	✓		
Appendix A: Raw data	✓	✓	Signed by lab instructor
Appendix B: Nomenclature	✓		
Appendix C: Sample of Calculations	✓	✓	In short hand-written
Appendix D: Reference graphs or tables	✓		
Appendix E: Other relevant information	✓		

GENERAL FORMATTING NOTES

- Paper and Margins:
  - White A4 paper, and printing on one side only.
  - Each major section of the report begins on a new page, unless the content is small it becomes inappropriate to separate the sections in different pages.
  - Use margins of: 2.5 cm left/right; and 1.27 cm top/bottom.

- Page numbering:
  - The title page should be left un-numbered although it has page number i.
  - All other pages may be numbered in the bottom side (center or right corner).
  - Roman numerals — i, ii, iii, iv etc. — are usually used to number the preliminary pages (Abstract, Table of Contents etc.).
  - Arabic numerals — 1, 2, 3, 4 etc. — are used to number the text from the Introduction page to the end of the Appendices.
  - Alternatively, pages in the Appendices can be numbered internally, according to the letter of the individual appendix and the number of pages within each appendix — A1, A2, B1, C1, C2, C3 etc. (where Appendix A has two pages; Appendix B has one page, and so on).
  - Use ***sections*** to create multiple stiles if page numbering.

- Font, Line Spacing, and Justification
  - Use Times New Roman; Font size: 12, Line spacing 1.5.
  - Extra line spacing should be used in the following cases:
    – to separate paragraphs.
    – to separate figures, tables, and equations.
  - Text may be justified to the left-side margin or Full justification (right and left margins). The latter is often preferred for formal documents and theses.

- Figures and Tables:
  - Figures include diagrams, graphs, sketches, photographs and maps.
  - All figures and tables may be centered.
  - All should be labelled in bold with the appropriate consecutive number (figures are generally labelled at the bottom, and tables at the top).
  - All figures and tables must be referred to in the text (e.g. ‘see Figure 14’); avoid using words such as ‘Figure above’ or ‘Table below’.
  - Font size of numbers and titles of axes should be large enough to be easily read.

- Writing tips:
  - Avoid writing long sentences, or overuse of the same expression.
  - Write in paragraphs of 10 lines each, separate paragraphs by lines.
  - Be brief and use transitional words of agreement, opposition, and causes. Read literature to learn writing styles.