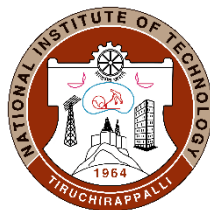


GUIDELINES
FOR THE PREPARATION OF
B.Tech. / M.Tech. / M.S. / Ph.D. Thesis



NATIONAL INSTITUTE OF TECHNOLOGY
TIRUCHIRAPALLI – 620 015
MARCH 2024

THESIS

The arrangement of parts of B.Tech. / M.Tech. / M.S. / Ph.D. Thesis

The sequence in which the thesis material should be arranged and bound should be as follows:

1. Cover page
2. Inside cover page
3. Dedication page (Optional)
4. Bonafide Certificate
5. Thesis certificate (For M.S. / Ph.D. only)
6. Abstract
7. Acknowledgements
8. Table of Contents
9. List of Tables
10. List of Figures
11. List of Symbols, Abbreviations or Nomenclature (Optional)
12. Chapters
13. Appendices
14. References
15. List of papers based on Thesis (For M.S. / Ph.D. only)
16. Brief Curriculum Vitae (For M.S. / Ph.D. only)
17. Doctoral Committee (For M.S. / Ph.D. only)

The formats in various headings are given below

Cover page	See Annexure 1
Inside cover page	Same as Cover page
Dedication page (if Any)	Should not exceed one page
Bonafide Certificate	See Annexure 2
Thesis Certificate	See Annexure 3
Abstract	Should not exceed two pages (about 600 words and should contain a maximum of 6 key words) See Annexure 4
Acknowledgements	Should not exceed two pages
Table of Contents	See Annexure 5
List of Tables	See Annexure 6
List of Figures	See Annexure 7
List of Symbols, Abbreviations or Nomenclature (Optional)	See Annexure 8,9
References	See Annexure 10

GUIDELINES FOR PREPARATION OF THESIS

THESIS FORMAT

The thesis manuscript has three basic parts: the preliminary pages, the text and the reference materials.

Preliminaries

The preliminary materials consist of the Title Page, Thesis Certificate, Abstract, Dedication (optional), Acknowledgements, Table of contents, List of tables, List of figures and other lists. Preliminary pages are paginated separately from the rest of the text. The title page is counted, but it is not numbered. Beginning with the page immediately following the title page, place page numbers in lowercase Roman numerals centered at the bottom of the preliminary pages. The Roman numerals are continued up to the first page of the text.

Proper Order of Preliminary Pages:

1. Title Page

The title of the thesis should be as concise as possible. It must occur consistently in every respect, including punctuation, capitalization, and hyphenation, on the abstract and approval forms. On the title page, the identical title must appear in all capital letters with each line centered on the page. The month in which the thesis is submitted, e.g., May, August, or January is to be printed at the bottom of the page. The title page is not numbered, but it is counted.

2. Abstract

The abstract should provide a succinct, descriptive account of the thesis. The abstract should not exceed 600 words, should be double-spaced, and should adhere to the same style manual as the thesis manuscript. The abstract should include pertinent place names, names of persons, and other proper nouns. These are useful in automated retrieval. A lower-case Roman numeral is used on the abstract page.

3. Dedication (optional)

The dedication is brief, single-spaced, and centered on the page (horizontally and vertically). No heading is used. The word "To" customarily begins the dedication.

4. Acknowledgement

This section begins with the title ACKNOWLEDGEMENTS centered in all capital letters. This page is used to thank those persons who have been instrumental to the student in completing the degree requirements. Acknowledgement of grants and special funding received to support the research also may be made on this page.

5. Table of Contents

The Table of Contents must include all chapter headings, the bibliography, and appendices. Entries are 1.5 lines spaced. The headings of major sections (i.e., chapters, bibliography, appendices) are written in all capital letters. Table of Contents headings must be identical to those in the text. Page numbers listed must be right-justified and connected to the appropriate entry by a line of evenly spaced dot leaders (periods). The words TABLE OF CONTENTS must be centered on the page two inches from the top of the first page only.

6. List of Tables (if tables appear in document)

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7. List of Figures (if figures appear in document)

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8. Other Lists (nomenclature, definitions, glossary of terms, etc.)

The appropriate title in all capital letters is centered two inches from the top of the first page only.

PAGE DIMENSIONS AND MARGIN

The thesis should be prepared on good quality white paper preferably not lower than 80 gsm. Standard A4 size (210 mm X 297 mm) paper should be used for preparing the copies. The final thesis should have the following page margins:

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TYPE-SETTING, TEXT PROCESSING AND PRINTING

The text shall be printed employing Laserjet or Inkjet printer, the text having been processed using a standard text processor. The standard font shall be Times New Roman of 12 pts with 1.5 line spacing. **The text must be 1.5 lines spaced and printed on only one side of each page.**

Text

The text must be divided into a logical scheme that is followed consistently throughout the document. The larger divisions and more important minor divisions are indicated by suitable, consistent headings. Chapter organization as practiced by the discipline should be followed. The student and the academic department are responsible for the quality and content of the text. Specific requirements for text presentation is given below.

1. Headings and Subheadings

The student may use headings and subheadings to subdivide chapters or sections, but a consistent sequence of headings as identified in the style guide selected must be followed. The student may not change the sequence and style of headings from chapter to chapter. Once the sequence is chosen, it must be followed consistently throughout the thesis.

2. Pagination

Lower-case Roman numerals are used to number all pages preceding the text. Although the preliminary paging begins with the title page, no number appears on that page. The page immediately following the title page is numbered with a lower- case Roman numeral. Beginning with the first page of the text, all pages are to be numbered with Arabic numerals consecutively throughout the thesis document, including the appendix and the bibliography or list of references. The Arabic numerals must be positioned at the bottom of the page, centered between the margins. Page headers or running heads may not be used in the thesis.

3. Tables and Figures

The term "table" refers to a columnar arrangement of information, often data sets, organized to save space and convey relationships at a glance. The term "figure" refers to graphs, drawings, diagrams, charts, maps, or photographs. All such details should be inserted in the text near where they are first mentioned. A table or figure may appear on

the same page as the text that refers to it or on a separate page. Each figure or table must be numbered and have a caption. Captions are placed below figures and pictures and above tables. Captions may be single-or double-spaced.

4. Illustrations

Each illustration must be referred to in the text and it must be placed after, and as near as possible to, the first reference to it in the text. All illustrative materials in the thesis must be prepared on paper that is the same weight (or stronger) and use the same font type as elsewhere in the manuscript. If illustrations are mounted, dry mounting must be used. Illustrations may not be mounted with rubber cement, staples, mucilage, or photo-mounting corners. Illustrative material must be drawn or computer-generated in black. Material may be laser-printed or drawn in waterproof, permanent ink. Color will reproduce in microfilm as shades of grey. Color should be used only if it is essential to the thesis.

5. Photographs

It is recommended that the student use a high quality, high contrast copying machine to reproduce photographic material for submission in lieu of photographs. If original photographs are used, they should be printed on single-weight, fiber-based paper with a matte finish. All prints must be processed for nationally established standards for chemical permanence. Black-and-white prints are preferable. Photograph page number placement follows the standard pagination requirements.

6. Appendix or Appendices

The appendix (or a series of appendices) immediately follows the main text. The appendix includes material that may be helpful to the reader of the thesis but may be too long for inclusion in the text or footnotes. The title, APPENDIX, appears only on the first page of the section, in capital letters centered two inches from the top. Examples of such material include questionnaires, letters, original data, sample forms, and vitae. Reference should be made in the text to the inclusion of these materials in the Appendix. Each appendix is a separate subdivision of the text and must begin on a separate page. Each appendix must be listed in the Table of Contents.

ORGANISATION OF THE THESIS

The thesis shall be presented in a number of *chapters*, *starting* with introduction and ending with **Summary and Conclusions**. Each of the other chapters will have precise title reflecting the contents of the chapter. A chapter can be subdivided into *sections*, *sub-sections* and *sub-sub-section* so as to present the content discretely and with due emphasis. **Each chapter shall begin on a fresh page**

1. Chapter and Section format

The title of **Chapter 1** shall be **Introduction**. It shall justify and highlight the problem poser and define the topic and the aim and scope of the work presented in the thesis. It may also highlight the significant contributions from the investigation.

Use only Arabic Numerals. Chapter Numbering should be centered on the top of the page using large bold print.

Example:

CHAPTER 1

Sections

A chapter can be divided into **Sections, Sub-sections and Sub-sub-sections** so as to present different concepts separately. Sections and sub-sections can be numbered using decimal points, e.g., 2.2 for the second Section in Chapter 2 and 2.3.4 for the fourth Sub-section in third Section of Chapter 2. Use only Arabic Numerals with decimals. Section numbering should be left justified using large bold print.

Example:

1.1 GENERAL

1.2 ADSORPTION

Sub Sections

Use only Arabic Numerals with two decimals. Sub section numbering should be left justified using large bold print.

Example:

1.1.1 Adsorption Isotherms

1.1.2 Langmuir Isotherms

etc

2. Review of Literature

This shall normally be the **Chapter 2** and shall present a critical appraisal of the previous work published in the literature pertaining to the topic of the investigation. The extent and emphasis of the chapter shall depend on the nature of the investigation.

For Example,

Several researchers attempted to develop mathematical models to simulate the activated sludge process. Some of these models simulate the organic removal mechanisms in wastewater treatment field, which were included in Jorgensen and Gromiec (1985), Henze (1986), Henze et al. (1987a), Tang et al. (1987), and Van Niekerk et al. (1988). The oxygen transfer mechanism has an important place in the activated sludge process. An estimation technique for the oxygen transfer capacity is investigated by Stenstrom et al. (1989).

3. Results and Discussions

This shall form the penultimate chapter of the thesis and shall include a thorough evaluation of the investigation carried out and bring out the contributions from the study. The discussion shall logically lead to inferences and conclusions as well as scope for possible further future work.

Table / Figure Format

As far as possible tables and figures should be presented in portrait style. Small size table and figures (less than half of writing area of a page) should be incorporated within the text, while larger ones may be presented in separate pages. Table and figures shall be numbered chapter –wise. For example, the fourth figure in Chapter 5 will bear the number **Figure 5.4** or *Fig.5.4*

Table number and title will be placed above the table while the figure number and caption will be located below the figure. Reference for Table and Figures reproduced from elsewhere shall be cited in the last and separate line in the table and figure caption, e.g. (after McGregor [12]).

Equations

All the equations should be typed in equation editor and should be properly numbered

For Example,

$$\Delta X \propto X \Delta t \tag{2.1}$$

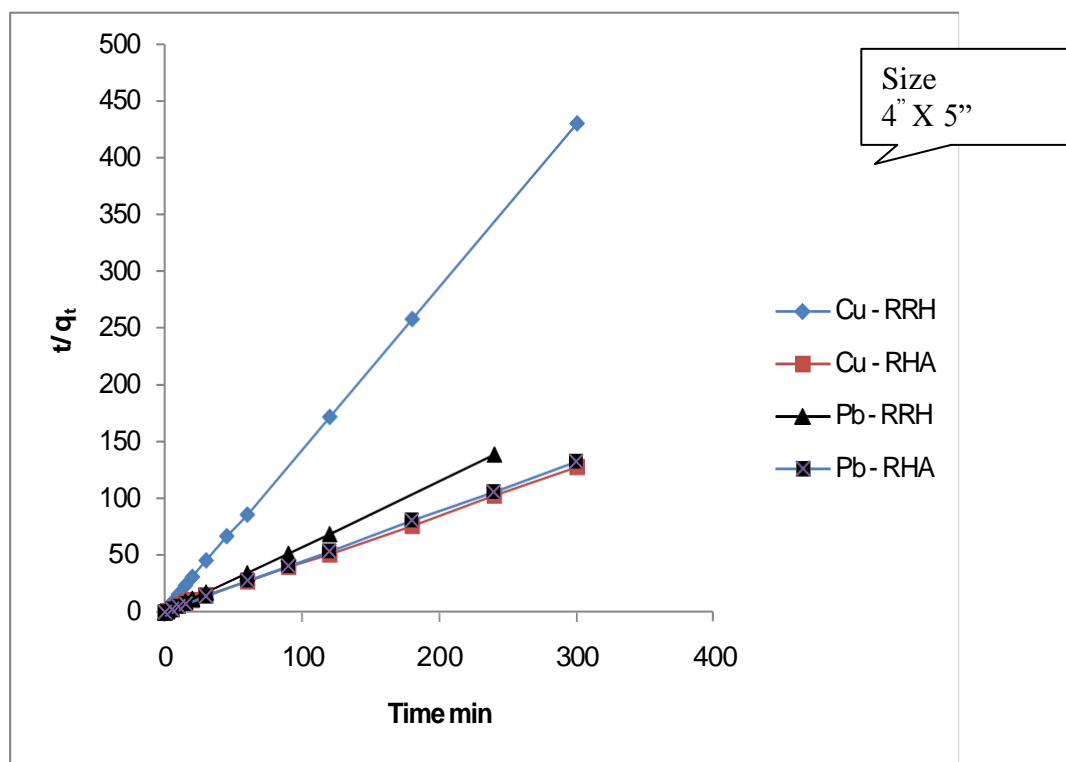


Fig. 10. Pseudo Second order plot for Copper and Lead on RRH and RHA

Table 5 Desorption Study

Cycle	Metal/ Adsorbent	Copper		Lead	
		RRH	RHA	RRH	RHA
1	Adsorption	73%	97.5%	81%	98%
	Desorption	99%	99.5%	98.5%	99%
2	Adsorption	40%	30%	80%	38%
	Desorption	99%	99%	98%	99%

4. Summary and Conclusions

This will be the final chapter of the thesis. A brief report of the work carried out shall form the first part of the Chapter. Conclusions derived from the logical analysis presented in the Results and Discussions Chapter shall be presented and clearly enumerated, each point stated separately. Scope for future work should be stated lucidly in the last part of the Chapter.

Please note: The Above is only a sample

Binding

The thesis shall be soft cover bound in leather or rexin with the black edge soft binding

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The front cover shall contain the following details:

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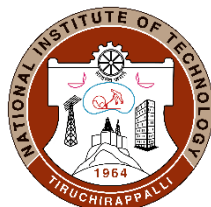
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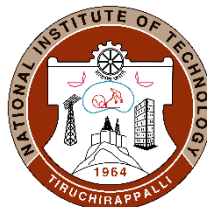
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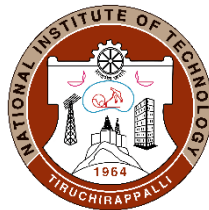
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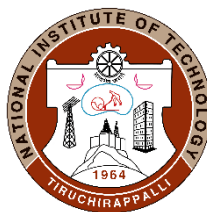
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National Institute of Technology
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(Name of the Co-Guide)
Co-Guide
Department of Civil Engineering
National Institute of Technology
Tiruchirappalli-620 015. India.

ABSTRACT

Removal of colour from industrial wastewater can be achieved by extraction using liquid emulsion membrane. A dye, named, Crystal Violet (CV) is extracted using water/oil/water liquid emulsion membrane. An experiment on single dye component is carried out. A stable emulsion is formed by agitating NaOH solution and an organic solvent (n-hexane) at high speed. Span 80 (surfactant) is used to stabilize the membrane. Extraction is carried out by dispersing the emulsion in an external water phase (feed) at lower speed resulting in the formation of small globules thereby increasing surface area and providing better extraction. The constituent (dye) to be extracted from the external phase diffuses through the membrane phase into the internal phase (NaOH solution). Reaction occurs in the internal phase resulting in the formation of sodium salt of the dye (s). The emulsion can be reused after demulsification. During extraction, the effect of Span 80, NaOH concentration, n-hexane, stirring speed and feed concentration have been investigated. The main objective of this study is to find the optimum operating conditions for the extraction of crystal violet.

Keywords: Emulsion; Internal phase; Extraction; Diffusion; Dye separation

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ABBREVIATIONS

AI	Artificial Intelligence
AR	Autoregressive Model
ARMA	Autoregressive Moving Average Model
ARMAX	ARMA with external input
ARX	AR with external input
ASM1	Activated Sludge Model 1
ASM2	Activated Sludge Model 2
ASM3	Activated Sludge Model 3
ASP	Activated Sludge Process
BOD	Biochemical Oxygen Demand
BSRT	Biological Solids Retention Time
COD	Chemical Oxygen Demand
DO	Dissolved Oxygen
F/M Ratio	Food to Microorganism Ratio
GA	Genetic Algorithm

NOTATIONS

K	Specific substrate utilization rate constant
k_d	Microbial decay coefficient
K_s	Substrate concentration when growth rate is half of maximum
Q	Rate of wastewater flow to the aeration tank
q	Specific substrate utilization rate
Q_e	Effluent flow rate
q_m	Maximum specific substrate utilization rate
Q_r	Rate of recycle sludge
Q_w	Rate of sludge wasting from the reactor
R	Recirculation ratio
S	Residual growth limiting substrate concentration
S_0	Substrate concentration in the raw water
S_e	Steady state substrate concentration after treatment
V	Volume of the aeration tank
X	Biomass concentration in the Aeration tank

References

1. Papers with Single Author,

Bruce Rittmann, E. (1996) How input biomass affects sludge age and process stability. *ASCE: Jour.Env.Engg*, **122**, 4-8.

2. Papers with Two Authors,

Bliss, P. J. and D. Barnas (1986) Modeling Nitrification in Plant Scale Activated Sludge. *Water Science and Technology*, **18**,139-148.

3. Papers with more than two Author,

Capodaglio, A.G., H.V. Jones, V. Novotny and X. Feng (1991) Sludge bulking analysis and forecasting: application of system identification and artificial neural computing technologies. *Water Res.*, **25**, 1217–24.

4. Books

APHA, AWWA and WPCF *Standard methods for the examination of water and wastewater*, 17th Edition, Washington, D.C.: American Public Health Association, 1989.

QUICK REFERENCE

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