

FOREWORD

Firstly, the writer would like to give thanks to Lord Jesus Christ for His blessings and inclusion during the final project lab work and thesis composition process, so that it can be finished well. The writer has gained many valuable experience and knowledge while doing the final project, which will be useful in the future.

The writer realizes that the completion of thesis with the title of “Study of Broccoli Treated with Green Tea as Sources of Antioxidant in Effervescent Drink Powder” can only be achieved by the supports, helps, and prayers from many people. Thus, the writer would like to give thanks to several people as follows:

1. Mr. Herry Cahyana, as the first thesis supervisor, for the guidance and support during the process and completion of thesis report.
2. Ms. Natania, as the second thesis supervisor, who is willing to guide the writer during the process and completion of thesis report.
3. Ms. Nuri Arum Anugrahati as the Head of Food Technology Department.
4. Mr. Herman Y. Kanalebe as the Dean of Faculty of Industrial Technology.
5. My parents, Tony Loekito Chandra and Indah Susianti Chandra, that had given the writer full support and prayer in fulfilling the final project.
6. Mr. Jeremia Manuel, Ms. Sisi Patricia, Mr. Adolf Parhusip, and Ms. Ratna Handayani as Heads of Quality Control Lab, Food Processing Lab, Microbiology Lab, and Research Lab.

7. Donny, Mr. Yosafat, Ade, Mr. Rudy, and Darius, as laborants of Food Processing Lab, Microbiology Lab, Quality Control Lab, and Chemistry Lab who were willing to help the writer in doing the research in the laboratories.
8. My best friends Fanie, Laura, Esmon, Mei, Dian, Kristy, and Lini who had patiently listen to the writer's complaints and ranting, give their support to the writer during the final project period, and sharing their problems as well.
9. Fellow friends under the same supervision: Jovita, Olga, Eric, Yohannes, Selina, Monika, Vega, and Monica Liandy, for supporting each other in completing the final project.
10. Fellow friends of "Genk Pahit" Fanie, Fambus, and Yus, for being in the same boat with the writer and releasing the writer's stress for a while, and Eric for volunteering to taste the products.
11. The panelists who were willing to taste the samples.
12. Every person who cannot be mentioned that had contributed to the completion of the thesis, either directly or indirectly.

The writer is aware that the thesis report is not perfect. The writer is also opened for any suggestion or critics that can improve the thesis report. Last but not least, thank you for the attention.

Karawaci, 20 January 2012

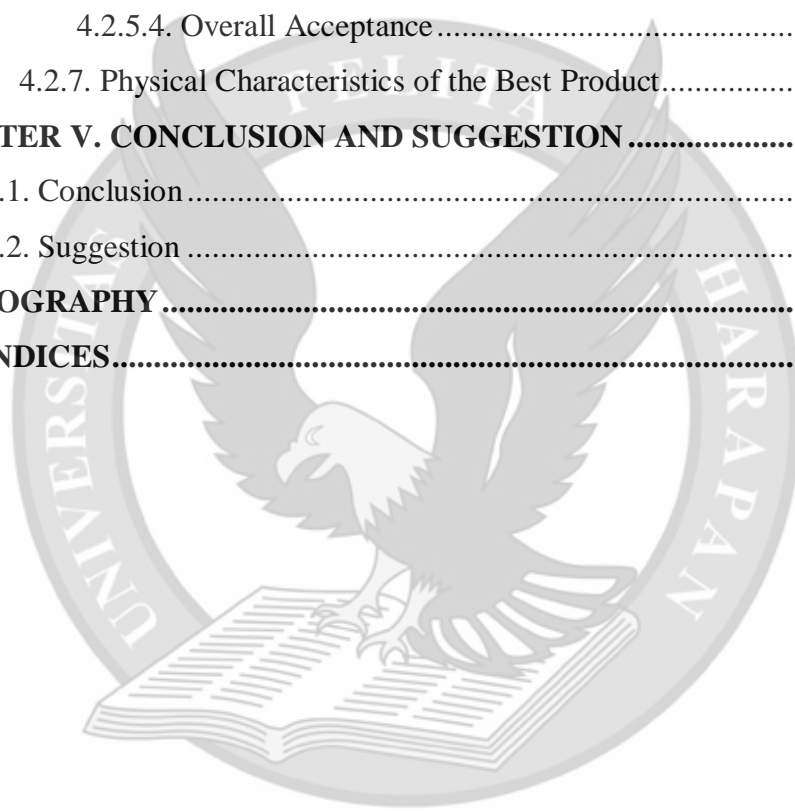
Writer

TABLE OF CONTENTS

	Pages
TITLE PAGE	
STATEMENT OF THESIS AUTHENTICITY	
APPROVAL BY THESIS SUPERVISORS	
APPROVAL BY THESIS EXAMINATION COMMITTEE	
ABSTRACT	vi
FOREWORD	vii
TABLE OF CONTENTS.....	ix
LIST OF TABLES	xii
LIST OF FIGURES	xiii
LIST OF APPENDICES.....	xiv
CHAPTER I. INTRODUCTION	1
1.1. Background.....	1
1.2. Research Problem	2
1.3. Objectives	2
CHAPTER II. LITERATURE REVIEW	3
2.1. Broccoli	3
2.2. Green Tea	5
2.3. Effervescent	6
2.3.1. Acid Source.....	6
2.3.2. Carbonate Source.....	7
2.3.3. Binder.....	7
2.4. Spray Drying.....	9
2.4.1. Atomization.....	9
2.4.2. Air Handling.....	10
2.4.3. Dryer Chamber	10
2.5. Antioxidant	10
CHAPTER III. RESEARCH METHODOLOGY	13
3.1. Materials and Equipments	13

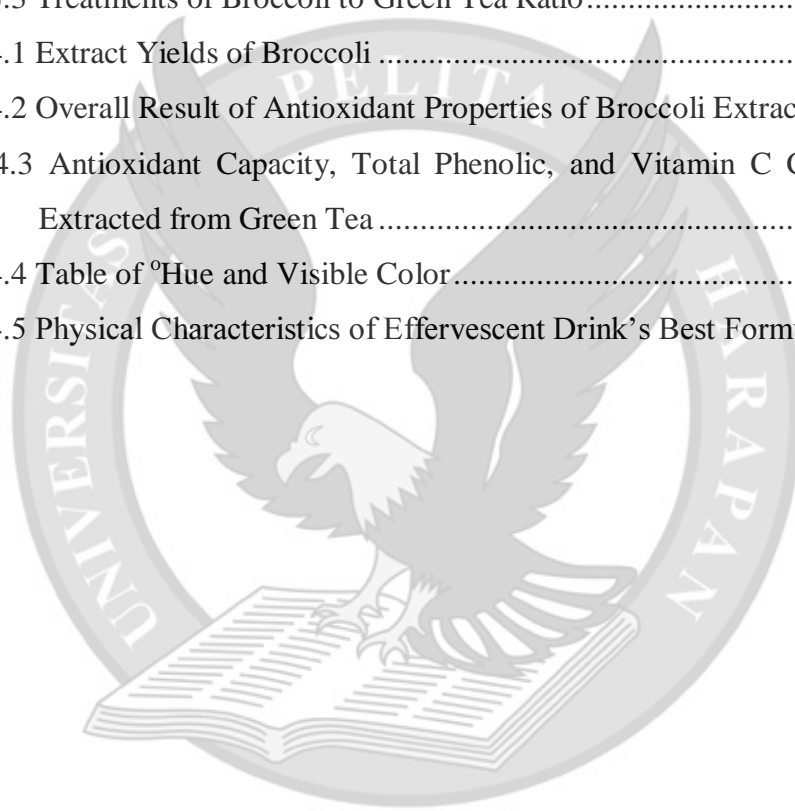
	Pages
3.2. Procedure.....	13
3.2.1. Preliminary Research.....	13
3.2.1.1. Statistical Design.....	15
3.2.2. Main Research.....	16
3.2.2.1. Statistical Design.....	18
3.3. Analyses.....	19
3.3.1. Moisture Content.....	19
3.3.2. Hygroscopicity.....	20
3.3.3. Solubility Time.....	20
3.3.4. Solubility.....	20
3.3.5. Foam Volume.....	21
3.3.6. Radical Scavenging Capacity.....	21
3.3.7. Vitamin C Content.....	21
3.3.8. Total Phenolic.....	22
3.3.9. Total Soluble Solid.....	22
3.3.10. °Hue.....	23
3.3.11. Hedonic Test.....	23
3.3.12. Extract Yield.....	23
CHAPTER IV. RESULTS AND DISCUSSIONS.....	24
4.1. Preliminary Research.....	24
4.1.1. Extract Yield of Broccoli and Green Tea.....	24
4.1.2. Effect of Broccoli Parts and Extraction Ratio.....	24
4.1.2.1. Antioxidant Capacity.....	25
4.1.2.2. Total Phenolic Content.....	26
4.1.2.3. Vitamin C Content.....	27
4.1.2.4. Determination of Optimum Broccoli Part and Extraction Ratio.....	28
4.1.3. Characterization of Antioxidant Activities of Green Tea Extract.....	29
4.2. Main Research.....	29

	Pages
4.2.1. Antioxidant Capacity	30
4.2.2. Total Phenolic Content	31
4.2.3. Vitamin C Content.....	32
4.2.4. Color Spectrum.....	33
4.2.5. Sensory Properties	34
4.2.5.1. Color Acceptance.....	34
4.2.5.2. Aroma Acceptance.....	36
4.2.5.3. Taste Acceptance	37
4.2.5.4. Overall Acceptance.....	38
4.2.7. Physical Characteristics of the Best Product.....	38
CHAPTER V. CONCLUSION AND SUGGESTION	41
5.1. Conclusion.....	41
5.2. Suggestion	42
BIBLIOGRAPHY.....	43
APPENDICES.....	46



LIST OF TABLES

	Pages
Table 2.1 Nutritional Content of Broccoli	4
Table 2.2 Nutritional Value of Green Tea	5
Table 3.1 Treatments of Broccoli Extract	14
Table 3.2 Formulations of Effervescent Drink (per 100 mL Water)	18
Table 3.3 Treatments of Broccoli to Green Tea Ratio	18
Table 4.1 Extract Yields of Broccoli	24
Table 4.2 Overall Result of Antioxidant Properties of Broccoli Extracts	28
Table 4.3 Antioxidant Capacity, Total Phenolic, and Vitamin C Content Extracted from Green Tea	29
Table 4.4 Table of °Hue and Visible Color	34
Table 4.5 Physical Characteristics of Effervescent Drink's Best Formulation	39



LIST OF FIGURES

	Pages
Figure 2.1 Whole Broccoli	3
Figure 3.1 Extraction of Broccoli for Analyses and Powder Making	14
Figure 3.2 Extraction of Green Tea for Analyses and Powder Making.....	15
Figure 3.3 Preparation of Broccoli/Green Tea Powder	17
Figure 3.4 Procedure of Effervescent Drink Powder Making.....	18
Figure 4.1 IC ₅₀ of Broccoli Extract.....	25
Figure 4.2 Total Phenolic Content of Broccoli Extracts.....	26
Figure 4.3 Vitamin C Content of Broccoli Extracts	27
Figure 4.4 IC ₅₀ of Effervescent Drink Powder.....	30
Figure 4.5 Total Phenolic of Effervescent Drink Powder.....	31
Figure 4.6 Vitamin C Content of Effervescent Drink Powder.....	32
Figure 4.7 Color Spectrum (°Hue) of Effervescent Drink	33
Figure 4.8 Color Acceptance of Effervescent Drink Samples	35
Figure 4.9 Aroma Acceptance of Effervescent Drink Samples	36
Figure 4.10 Taste Acceptance of Effervescent Drink Samples.....	37
Figure 4.11 Overall Acceptance of Effervescent Drink Samples.....	38
Figure 4.12 Amount of Water Absorbed by Best Effervescent Powder Formulation over Time	39

LIST OF APPENDICES

	Pages
Appendix A. Yield of Broccoli and Green Tea Extract	47
Appendix B. Antioxidant Capacity of Broccoli Extracts.....	48
Appendix C. Total Phenolics of Broccoli Extracts.....	50
Appendix D. Vitamin C Content of Broccoli Extracts	52
Appendix E. Antioxidant Properties of Green Tea Extract.....	54
Appendix F. Antioxidant Capacity of Effervescent Drinks	56
Appendix G. Total Phenolics of Effervescent Drinks	58
Appendix H. Vitamin C Content of Effervescent Drinks	60
Appendix I. °Hue of Effervescent Drinks	62
Appendix J. Acceptance of Effervescent Drinks.....	63
Appendix K. Physical Characteristics of Product Best Formulation.....	73
Appendix L. Template of Consumer Acceptance Questionnaire	77

