

CONTENTS

DECLARATION OF AUTHENTICITY	v
ACKNOWLEDGEMENT	vi
ABSTRACT.....	vii
CHAPTER I INTRODUCTION.....	1
1.1. Background	1
1.2. Research problems	4
1.3. Objectives	4
CHAPTER II LITERATURE REVIEW	5
2.1. Fish Protein Isolate	5
2.2. Preparation of Fish Protein Isolate.....	5
2.3. Composition and Some Characteristics of Fish Protein Isolate.....	7
2.4. Water activity	9
2.5. Color	9
2.6. Water Holding Capacity (WHC)	10
2.8. Biodegradable polymer and film	10
2.9. Bio-based polymer	11
2.10. Petrochemical-based polymer	13
2.11. Fish Squalene	13
2.11.1. Definition and Sources	13
2.11.2. Properties of Squalene Extracted from Fish Liver	14
2.11.3. Use of Squalene as Property Modifier in Protein-based Films	15
CHAPTER III MATERIALS AND METHODS	17
3.1. Materials	17

3.1.1.	Raw Materials and preparation.....	17
3.1.2.	Chemicals	17
3.1.3.	Equipment	17
3.2.	Methods.....	18
3.2.1.	Extraction of protein from salmon frame at various conditions.....	18
3.2.2.	Preparation of salmon frame protein isolate (SFPI) and study on effect of defatting on composition and some properties of SFPI and it's film	19
3.2.3.	Study on effect of glycerol and squalene on properties of film from salmon frame protein isolate (SFPI).....	20
3.2.4.	Characterization of selected films	22
3.2.5.	Experimental design and statistical analysis	24
CHAPTER IV RESULTS AND DISCUSSION		25
4.1.	Extraction of protein from salmon frame.....	25
4.1.1.	Effect of form of salmon frame	25
4.1.2.	Effect of extraction condition (ratio of sample/water and time)	25
4.2.	Composition and yield of SFPI as affected by form and defatting	27
4.2.1.	Some characteristic of SFPI films as affected by form and defatting	29
4.3.	Properties of SFPI Film as influenced by glycerol and squalene	31
4.3.1.	Characteristic of film from SFPI.....	31
4.3.2.	Thickness and mechanical properties.....	31
4.3.3.	Color and Transparency	35
4.3.4.	WVP	38
4.4.	Characteristics of SFPI Films Incorporated with GLY and SQ at Selected Level	39
4.4.1.	Oxygen Permeability (OP)	39
4.4.2.	ATR-FTIR	41
4.4.3.	Thermal property (TGA analysis)	44

4.4.4. Water Contact Angle	46
CHAPTER V CONCLUSION.....	48
CHAPTER VI SUGESTIONS.....	49
REFERENCES	50
APPENDIXES	54

LIST OF TABLE

Table 1. Protein recovery of ground and unground SF before precipitation	25
Table 2. Protein content of ground salmon frame at each various extraction conditions	26
Table 3. Proximate composition and yield of ground and unground SFPI before and after defatting	29
Table 4. Color comparison at day-1 and day-12 of film of defatted and undefatted SFPI prepared from ground and unground SF	29
Table 5. The TBARS value of defatted and undefatted SFPI film	31
Table 6. Color of SFPI films incorporated with glycerol (50% and 65%) and squalene at different concentrations (0%, 10%, 20%, and 30%).....	37
Table 7. Light transmittance at 600 nm (%T) and transparency value of SFPI film incorporated with glycerol (50% and 65%) and squalene at different concentrations (0%, 10%, 20%, and 30%)	38
Table 8. WVP of SFPI incorporated with glycerol (50% and 65%) and squalene at different concentrations (0%, 10%, 20%, and 30%)	39
Table 9. Oxygen permeability (OP) of SFPI films incorporated with 50% and 65% GLY with and without 30% SQ	41
Table 10. Thermal degradation temperature (Td, °C) and weight loss (ΔW , %) of SFPI films incorporated with 50% and 65% GLY without and with 30% SQ	44
Table 11. Water contact angle and images of water droplet over the surface SFPI films incorporated with 50% and 65% without and with 30% SQ	47

LIST OF FIGURE

Figure 1. Protein characteristic at its isoelectric point (pI).....	8
Figure 2. Two and Three Dimensional Structure of Squalene	14
Figure 3. Structure of squalene as trepenoid lipid	14
Figure 4. Thickness of SFPI incorporated with glycerol (50% and 65%) and squalene at different concentrations (0%, 10%, 20%, and 30%).	34
Figure 5. Tensile strength of SFPI film incorporated with glycerol (50% and 65%) and squalene at different concentrations (0%, 10%, 20%, and 30%)).	34
Figure 6. Elongation at break of SFPI film incorporated with glycerol (50% and 65%) and squalene at different concentrations (0%, 10%, 20%, and 30%)).	35
Figure 7. Young's modulus of SFPI film incorporated with glycerol (50% and 65%) and squalene at different concentrations (0%, 10%, 20%, and 30%).	35
Figure 8. FTIR spectra of SFPI films incorporated with 50% and 65% GLY without and with 30% SQ.....	44
Figure 9. TGA graph of SFPI films incorporated with 50% and 65% GLY without and with 30% SQ.....	46

APPENDIXES

Appendix 1. Determination of soluble protein via Lowry method	54
Appendix 2. Proximate composition analysis of SFPI.....	55
Appendix 3. FTIR spectrum of different SFPI-based films.....	58
Appendix 4. TGA curves of different SFPI-based films.....	62
Appendix 5. Summary of thickness, Young's modulus (YM), Tensile strength (TS) and Elongation at break (EAB) of SFPI films containing various levels of glycerol (GLY) and squalene (SQ).....	66