

**FORMULATION AND PERFORMANCE OF
Nigella sativa SEED EXTRACT ON SUNSCREEN**

ISHATUL ALYAA BINTI NOOR SAIFUL AZHAR

**BACHELOR OF SCIENCE (Hons.) CHEMISTRY
FACULTY OF APPLIED SCIENCES
UNIVERSITI TEKNOLOGI MARA**

AUGUST 2024

**FORMULATION AND PERFORMANCE OF
Nigella sativa SEED EXTRACT ON SUNSCREEN**

ISHATUL ALYAA BINTI NOOR SAIFUL AZHAR

**Final Year Project Report Submitted in
Partial Fulfilment of the Requirements for the
Degree of Bachelor of Science (Hons.) Chemistry
in the Faculty of Applied Sciences
Universiti Teknologi MARA**

AUGUST 2024



UNIVERSITI
TEKNOLOGI
MARA

Fakulti
Sains Gunaan

**SUBMISSION FOR EVALUATION
FINAL YEAR PROJECT 2 - RESEARCH PROJECT/ CRITICAL REVIEW/ CASE
STUDY**

**FORMULATION AND PERFORMANCE OF *Nigella sativa* SEED EXTRACT ON
SUNSCREEN**

Name : Ishatul Alyaa Binti Noor Saiful Azhar
Student ID : 2022981703
Program : AS245
Course code : FSG671
Mobile Phone : 01169560695
E-mail : Ishatulalyaa01@gmail.com

** Please attach the Turnitin summary report, with your name clearly stated, at the end of your report and submit it together.*

Approval by Main Supervisor :

I certify that the work conducted by the above student is completed and approve this report to be submitted for evaluation.

Supervisor's name : Madam Noor Hafizah Binti Uyup
Date : 26/7/2024
Turnitin Similarity % : 13%
Signature :

TABLE OF CONTENTS

	Page
ACKNOWLEDGEMENTS	i
TABLE OF CONTENTS	ii
LIST OF TABLES	iii-iv
LIST OF FIGURES	v
LIST OF SYMBOLS	vi
LIST OF ABBREVIATIONS	vii-ix
ABSTRACT	x
ABSTRAK	xi
CHAPTER 1 INTRODUCTION	
1.1 Background	1-3
1.2 Problem statement	3-4
1.3 Research questions	5
1.4 Objectives	5
1.5 Significance of study	5-6
1.6 Expected outcomes	6-7
CHAPTER 2 LITERATURE REVIEW	
2.1 Sunscreen	
2.1.1 Introduction to sunscreen and its importance	8-9
2.1.2 Range of protection categories	9-10
2.1.3 Sun Protection Factor (SPF)	10
2.2 Classification of sunscreens	
2.2.1 Synthetic sunscreen	11-13
2.2.2 Natural sunscreen	13-15
2.3 Properties of ideal sunscreen	16
2.4 Linoleic acid	16-17
2.4.1 Physiological function of linoleic acid	17-19
2.5 <i>Nigella Sativa</i> and linoleic acid compound as natural sunscreen	
2.5.1 Background of <i>Nigella sativa</i>	19-20
2.5.2 Properties and chemical composition of <i>Nigella sativa</i> seed extract	21-22
2.6 Previous research on extraction of <i>Nigella sativa</i> seeds by using Soxhlet Extraction	22-23
2.7 Previous research on identification of linoleic acid as active compounds in <i>Nigella sativa</i> seed extract by Gas Chromatography Mass Spectrometry (GC-MS).	23-24
2.8 Formulation techniques for incorporating <i>Nigella sativa</i> seed extract in sunscreen	24-25
2.9 Evaluation of the sunscreen cream	26-28

2.11	Anti-fungal activity determination by screening of <i>Nigella sativa</i> sunscreen	28-29
2.12	Determination the Sun Protective Factor (SPF) value of <i>Nigella sativa</i> sunscreen using UV-Vis Spectrophotometry	29-30

CHAPTER 3 METHODOLOGY

3.0	Introduction	31
3.1	Materials and chemicals	
	3.1.1 Raw material	31
	3.1.2 Chemicals	32
3.2	Extraction <i>Nigella sativa</i> seed extract by Soxhlet Extraction	
	3.2.1 Sample preparation	32
	3.2.2 Sample extraction	32
	3.2.3 <i>Nigella sativa</i> seed extraction yield	33
3.3	Characterization of linoleic acid in <i>Nigella sativa</i> extract by Gas Chromatography Mass Spectrum (GC-MS)	33-34
3.4	Antifungal activity	34
3.5	Formulation of sunscreen from <i>Nigella sativa</i> extract W/O base phase	
	3.5.1 Preparation of water phase	35
	3.5.2 Preparation of oil phase	35
	3.5.3 Preparation of sunscreen of W/O base phase	36
3.6	Physicochemical characteristic of sunscreen cream	
	3.6.1 Determination of pH	36
	3.6.2 Determination of spreadability	36
	3.6.3 Determination of physical parameter	36
3.7	Determination the Sun Protective Factor (SPF) value of <i>Nigella sativa</i> sunscreen using UV-Vis Spectrophotometry	37
3.8	Experimental design/Flow chart	38

CHAPTER 4 RESULTS AND DISSCUSSION

4.1	Preparation of linoleic acid from <i>Nigella sativa</i> seed extract	39-40
4.2	GC-MS studies of linoleic acid in <i>Nigella sativa</i> seed extract	41-42
4.3	Antifungal activity studies of linoleic acid in <i>Nigella sativa</i> seed extract	43-44
4.4	Formulation of sunscreen cream from <i>Nigella sativa</i> seed extract studies	44-47
4.5	Physicochemical characterization studies of sunscreen cream	47-49
4.6	UV-Vis Spectrophotometry of sunscreen cream SPF value	49-50

CHAPTER 5 CONCLUSIONS AND RECOMMENDATIONS 51-52

GANT CHART	53
REFERENCES	54-63
CURRICULUM VITAE	64-65