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EXTRACTION OF EUGENOL COMPOUNDS FROM CLOVES BY USING DIFFERENT SOLVENTS

Name	:	FAIZ RIDZUAN BIN KHAIRUL
Student ID	:	2023149819
Program	:	APPLIED CHEMISTRY AS245
Course code	:	FSG671
Mobile Phone	:	
E-mail	:	faizridzuan307@gmail.com

Approval by Main Supervisor :

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

Supervisor's name	:	TS. DR ABU HASSAN BIN NORDIN
Date	:	14 February 2026
Similarity	:	11%
Signature	:	

EXTRACTION OF EUGENOL COMPOUNDS FROM CLOVES BY USING DIFFERENTSOLVENTS

FAIZ RIDZUAN BIN KHAIRUL

BACHELOR OF SCIENCE (Hons.)
MATERIALS SCIENCE AND TECHNOLOGY
FACULTY OF APPLIED SCIENCES
UNIVERSITI TECHNOLOGI MARA

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This Final Year Project Report entitled **" Extraction of Eugenol Compounds from Cloves by Using Different Solvents"** was submitted by Faiz Ridzuan bin Khairul in partial fulfillment of the requirements for the Degree of Bachelor of Science (Hons.) Applied Chemistry, in the Faculty of Applied Sciences, and was approved by

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Ts. Dr. Abu Hassan bin Nordin
Supervisor
B. Sc. (Hons.) Applied Chemistry
Faculty of Applied Sciences
Universiti Teknologi MARA
02600 Arau
Perlis

_____

Mdm. Farhana binti Othman
Project Coordinator
B. Sc. (Hons.) Applied Chemistry
Faculty of Applied Sciences
Universiti Teknologi MARA
02600 Arau
Perlis

_____

Dr. Nur Nasulhah Kasim
Head of Programme
B. Sc. (Hons.) Applied Chemistry
Faculty of Applied Sciences
Universiti Teknologi MARA
02600 Arau
Perlis

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TABLE OF CONTENTS

ABSTRACT

EXTRACTION OF EUGENOL COMPOUNDS FROM CLOVES USING DIFFERENT SOLVENTS

Clove (*Syzygium aromaticum*) is a well-known medicinal plant rich in phenolic compounds, particularly eugenol, which exhibits strong antioxidant and antimicrobial properties. This study aimed to investigate the effect of different solvents on the extraction efficiency of phenolic compounds from clove using the maceration method. Three solvents with different polarities, 80% ethanol, distilled water, and acetic acid, were used to evaluate their effects on the extraction yield, and to analyse the eugenol compound in clove extracts. Clove buds were dried, ground, and extracted using maceration extraction at room temperature for 48 hours. Extraction yield was determined using rotary evaporation for ethanol and acetic acid extracts, while liquid–liquid extraction followed by rotary evaporation was applied for the distilled water extract. The extraction yield of the clove extract obtained with 80% ethanol was the highest (22.3%), followed by distilled water (11%), while acetic acid produced the lowest yield (8%). Characterization of the extracts was carried out using Fourier Transform Infrared Spectroscopy (FTIR) to identify functional groups, with major peaks was observed at 3000-3400 cm^{-1} for (O-H stretch), 1500-1600 cm^{-1} (C=C stretch), 1200-1400 cm^{-1} (C-O stretch), and 1600-1800 cm^{-1} (C=O stretch), indicate the presence of eugenol compounds. Gas Chromatography–Mass Spectrometry (GC–MS) analysis further verified the phenolic compounds in clove extracts with 97% quality match of eugenol. High-Performance Liquid Chromatography (HPLC) was used to analyze the concentration of eugenol compounds based on their retention time and peak area. The study confirmed that 80% ethanol solvent is most suitable for extracting phenolic compounds from clove using maceration extraction, highlighting the importance of solvent polarity in optimizing extraction efficiency.