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DEVELOPMENT, CHARACTERIZATION AND PERFORMANCE ASSESMENT OF BIODEGRADABLE OIL SORBENTS FROM SPENT COFFEE GROUNDS AND NATURAL FIBRES.

Name	NUR AMIRAH BINTI MOHAMMAD ZAHIR
Student ID	2022616028
Program	AS222 - BACHELOR OF SCIENCE (HONS) CHEMISTRY WITH MANAGEMENT
Course code	FSG631
Mobile Phone	
E-mail	2022616028@student.uitm.edu.my

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	DR NUR NASULHAH BINTI KASIM
Date	14 February 2026
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NUR AMIRAH BINTI MOHAMMAD ZAHIR

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This Final Year Project Report entitle "**Development, Characterization and Performance Assesment of Biodegradable Oil Sorbents from Spent Coffee Grounds and Natural Fibres**" was submitted by Nur Amirah binti Mohammad Zahir in partial fulfilment of the requirements for the Degree of Bachelor of Science (Hons.) Chemistry with Management, in the Faculty of Applied Sciences, and was approved by

_____

Dr Nur Nasulhah binti Kasim
Supervisor
B.Sc. (Hons.) Applied Chemistry
Faculty of Applied Science,
Universiti Teknologi MARA,
02600 Arau, Perlis

_____

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

_____

Dr Nur Nasulhah binti Kasim
Head of Programme
Faculty of Applied Science
Universiti Teknologi MARA
06200 Arau, Perlis

Date: _____

ABSTRACT

Nowadays, anything possessing environmentally friendly features is one of the most desired qualities in technology. Sustainable features are one of the most desired qualities in technology. As sustainable oil absorbents, this study examines the properties and oil absorption capabilities of spent coffee grounds (SCG) mixed with natural polymer particularly kapok and cotton. To assess its effectiveness, SCG, which is well known for its porous structure and high carbon content, was mixed separately with kapok and cotton in various weight ratios. The components were dried, ground and mixed to create the composites, which were then moulded and dried in the oven to create absorbent pads. The materials functional groups, surface morphology, surface area, and crystallinity were investigated using characterization methods such Density, Oil absorption capacity, Fourier Transform Infrared Spectroscopy (FTIR), and flexibility using tensile strength test of the oil spill kit. According to oil absorption test, SCG had a much lower absorption capacity (0.3885g/g), whereas cotton had the maximum oil uptake (9.472 g/g), followed by kapok fibre (8.782 g/g). the findings show that fibres with larger porosity and lower density perform better in oil absorbing. Functional groups that affect oil affinity and absorption behavior, such as hydroxyl (O-H), aliphatic (-CH), and cellulose-related bonds, were verified by FTIR analysis. Tensile strength tests showed that the material composition affected the absorbent pad mechanical stability. Overall, the results indicate that cotton and kapok fibres are very good at absorbing oil, and SCG may be used as a filler. This study shows how natural and waste-derived materials may be used as inexpensive, environmentally acceptable substitutes for manufactured oil absorbents.

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