MU'IZZ MUHAIMIN BIN AHMAD SUBRI

AS245 FSG

UiTM 2024

TREATED SUGARCANE BAGASSE FIBER REINFORCED UNSATURATED POLYESTER COMPOSITE: THE IMPACT OF FIBER SIZES ON THE MECHANICAL AND PHYSICAL PROPERTIES

MU'IZZ MUHAIMIN BIN AHMAD SUBRI

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

FEBRUARY 2024

TREATED SUGARCANE BAGASSE FIBER REINFORCED UNSATURATED POLYESTER COMPOSITE: THE IMPACT OF FIBER SIZES ON THE MECHANICAL AND PHYSICAL PROPERTIES

MU'IZZ MUHAIMIN BIN AHMAD SUBRI

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

FEBRUARY 2024

This Final Year Project Report entitled **"Treated sugarcane bagasse fiber reinforced unsaturated polyester composite: The impact of fiber sizes on the mechanical and physical properties"** was submitted by Mu'izz Muhaimin Bin Ahmad Subri in partial fulfillment of the requirement for the Degree of Bachelor of Science (Hons) Applied Chemistry, in the Faculty of Applied Sciences, and was approved by

Madam Siti Noorashikin binti Jamal
Supervisor
B. Sc. (Hons.) Polymer Technology
Faculty of Applied Science
Universiti Teknologi Mara
02600 Arau
Perlis

Dr. Siti Nurlia Binti Ali
Project Coordinator
B. Sc. (Hons) Applied Chemistry
Faculty of Applied Sciences
Universiti Teknologi MARA
02600 Arau
Perlis

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

Date: February 2024

TABLE OF CONTENTS

ABSTRACT

TREATED SUGARCANE BAGASSE FIBER REINFORCED UNSATURATED POLYESTER COMPOSITE: THE IMPACT OF FIBER SIZES ON THE MECHANICAL AND PHYSICAL PROPERTIES

The mechanical and physical properties of different sizes of treated sugarcane bagasse fiber (SBF) reinforced with unsaturated polyester resin (UPR) as a green alternative to synthetic fiber were successfully studied. The characterization of untreated and treated bagasse fiber was done using Fourier Transform Infrared Spectroscopy (FTIR). FTIR results in this study show that 5% alkali treatment removed impurities from the fiber surface. This is proved by the disappearance of peaks related to hemicellulose and lignin before and after surface treatment. The hand lay-up method was used for the fabrication of UPR/SBF composites using five different filler formulations (0g, 2g, 4g, 6 g, and 8g) for short and powdered fiber. The constructed composites were tested for their mechanical (tensile test and impact test) and physical (water absorption test) properties. The highest tensile strength recorded in this study is in a 2g sample of UPR/short SBF composite at 32.11 MPa. The highest Young's modulus recorded in this study is from a 4g sample of UPR/short SBF composite at 1155.61 MPa. The elongation at break test shows a decreasing trend with an increasing fiber loading for both short and powder SBF composites. An 8g sample of UPR/powder SBF composite recorded the lowest value for elongation at the break test at 3.3%. The impact strength of the 8g sample for the UPR/powder SBF composite recorded the highest value at 7.42 J/M. The water absorption test shows that both short and powder SBF composites absorb an increasing amount of water with increasing fiber loading. However, UPR/short SBF composites have a higher water absorption value compared to UPR/powder SBF composites at the same amount of fiber loading.