

**THE FUNCTION OF CALCIUM CARBONATE IN ENHANCING
STIFFNESS OF ULTRA HIGH MOLECULAR WEIGHT
POLYETHYLENE**

MUHAMMAD IZZAT BIN AHAMAD HASIM

**Final Year Project Report Submitted In
Partial Fulfilment of The of The Requirement for The
Degree Of Bachelor of Science (Hons.) Chemistry With Management
In The Faculty of Applied Science
Universiti Teknologi Mara**

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This Final Year Project Report entitled **“The Function Of Calcium Carbonate in Enhancing Stiffness of Ultra High Molecular Weight Polyethylene”** was submitted by Muhammad Izzat Bin Ahamad Hasim in partial fulfillment of the requirements for the Degree of Bachelor of Science (Hons.) Chemistry With Management, in the Faculty of Applied Sciences, and was approved by

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ABSTRACT

THE FUNCTION OF CALCIUM CARBONATE IN ENHANCING STIFFNESS OF ULTRA HIGH MOLECULAR WEIGHT POLYETHYLENE

The aim of this study is to assess the impact of Calcium carbonate (CaCO_3) as a filler on the stiffness and mechanical strength of ultra-high molecular weight polyethylene (UHMWPE) which is a widely applied polymer with limitations with processing and resistance to creeping. Solid-state compression molding was used to prepare composites of varying CaCO_3 concentration (5, 10, and 20 php) which were then subjected to analysis for tensile strength, morphology, and chemical composition. FTIR analysis showed that CaCO_3 was successfully incorporated, and the tensile tests showed a reduction in strength at lower filler concentrations which improved at higher loading. Morphology studies indicated that increasing filler CaCO_3 concentration increased the distribution of the filler but also showed some problems of agglomeration at lower CaCO_3 concentrations. These results show that when CaCO_3 is evenly dispersed within UHMWPE, it does enhance the stiffness and properties of the polymer. This study shows the potential of CaCO_3 as a low-cost filler in improving the performance of UHMWPE for industrial and biomedical applications. More optimization on the mixing method and actual testing will increase the quality and reliability of the material.

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