

UNIVERSITI TEKNOLOGI MARA

**PUNCTURE RESISTANCE AND
CHARACTERIZATION OF COATED
NATURAL RUBBER LATEX (NRL)
ULTRA HIGH MODULUS
POLYETHYLENE (UHMPE) UPON
HEAT AGEING.**

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MSc

September 2020

AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the results of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Post Graduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

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ABSTRACT

This study focuses on the effect of heat ageing towards the puncture resistance of coated natural rubber (NR) latex unidirectional (UD) ultra high modulus polyethylene (UHMPE) fabric. The application of NRL was done by dipping method namely single dip (SD), double dip (DD) and triple dip (TD). Heat ageing methods were categorized as accelerated condition and environmental condition. The samples were exposed to heat at different elevated temperatures for 48 hours and 192 hours to accelerate the effect while for environmental condition, the samples were placed inside a car trunk for the duration of one year to accumulate the variable temperature and humidity inside a car. The puncture resistance of coated fabric in accelerated heat ageing decrease by 57%, 44% and 29% for SD, DD and TD respectively. The coated Samples stored inside a car trunk shows a reduction on the puncture resistance by 9.4%, 6.4% and 26% for SD, DD and TD respectively. The morphology of the aged and unaged samples for uncoated and coated NRL UD UHMPE was examined using Field Emission Scanning Electron Microscope (FESEM) and light microscope. Spectroscopy test using Fourier Transform Infrared Spectroscopy (FTIR) shows some changes in the molecular arrangement of the materials. Thermogravimetric analysis (TGA) was used to analyses the thermal stability of the material. As a conclusion, it can be said that heat and humidity affected the coated sample strength and reduced the absorption capability of the materials towards puncture resistance.

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