

UNIVERSITI TEKNOLOGI MARA

**BLENDS OF NR WITH EPDM WASTE
DEVULCANIZED BY MICROWAVE:
MECHANICAL PROPERTIES AND
SELF HEALING ABILITY**

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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 Undergraduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

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ABSTRACT

BLENDS OF NR WITH EPDM WASTE DEVULCANIZED BY MICROWAVE: MECHANICAL PROPERTIES AND SELF HEALING ABILITY

The development in rubber industry may have serious impact on the earth which the increasing of rubber volume has become a huge waste. It is difficult to deal waste rubber as it cannot recycle easily to turn into new product. The devulcanization by microwave process can break apart the crosslink network and could reduce the Ethylene-Propylene-Diene Monomer (EPDM) waste. The Natural Rubber (NR) blends with EPDM waste with different accelerator/sulphur ratio ($A/S = 0.2, 1, 4$). The EPDM waste was grind into small pieces and blend with natural rubber. The compounding process is prepared by two-roll mill at room temperature. The cure time, tensile properties, hardness, abrasion resistance, FTIR analysis and self-healing ability of rubber blends were tested. The results obtained from blending of NR with M-EPDMA shows an increasing in tensile strength which is 3.9 MPa, tensile strain is 108.26%, swelling test 108.69%, decrease in hardness of 50.4. abrasion resistance index of 240.07 and Young Modulus value is 6.4. The formation of sulphur-sulphur (S-S) give 831.99 cm^{-1} showed the existence of chain break during microwave process and formation of peak at the $N=C=S$ bond 2114.07 cm^{-1} assign that present only in the M-EPDM A because it had the lowest A/S ratio. Self-healing ability of the rubber showed the changes depending on the accelerator/sulphur ratio