

**Study on Physical and Mechanical Properties of Rubber Latex Composites
with SiO₂ Addition**

By

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(Mechanical Engineering)

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CERTIFICATION OF APPROVAL

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Approved by,

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CERTIFICATION OF ORIGINALITY

This is to certify that I am responsible for the work submitted in this project, that the original work is my own except in the references and acknowledgement, and that the original work contained herein have not been undertaken or done by unspecified sources or persons.

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ABSTRACT

The Study on Physical and Mechanical Properties of Rubber Latex Composites with SiO₂ addition have two main objectives which are to study and establish the physical and mechanical properties of the rubber wood lignin composites and evaluate the oil resistance effect of RWL composites with SiO₂ addition. Silica sand that used in this project is collected from around Tronoh and has the particles size of less than 43µm. There is a derivation of process of new lignin from Malaysian Rubber tree but there is still no establishment on their relevant properties. This project will investigate the good property of rubber wood lignin and silica sand by produce a newly improved rubber and establish on relevant physical and mechanical properties of the rubber wood lignin composites with silica sand addition. This study will cover the understanding of composites advantages. The preparation of silica sand to produce 43µm size is by using ball milling. This silica will through the mixing process with sulphur as cure agent and zinc oxide as activator and lignin as additive in rubber. After mixing, the rubber composites will be stored in the bottle for maturation for two days, and casting. The rubber film will be rinse off with water and hanging for one day. The last process is drying in oven at 100°C for 30 min and stamping into the dumbbell and circular shape for further testing. The result obtains is elastic modulus increasing from 0.043MPa for Batch 1 to 0.095MPa for Batch 2 and 0.142MPa for Batch 3. The same pattern can be observed for Batch 4 which has a value of 0.085MPa and 0.100 for Batch 5. The FESEM study shown us that in Batch 2 and Batch 4 there have silica agglomerates caused by the non-uniform distribution of silica in rubber compound which leads to brittlement of the material. Based on swelling testing results, Batch 1 (control) was less resistance to oil, 125% due to unsaturated polymer which is degrades in oil. Oil resistance was far worse when the percentage of silica content was 6%, 141.7% for Batch 2 and 120.4% for Batch 4 as compared to 111.6% for Batch 3 and 92.1% for Batch 5 which has 12% of silica contents which were improved. Therefore, the good physical property in oil resistance was established in Batch 3 and Batch 5 will give huge contribution in industrial and automotive industry.

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