

5.5 CONCLUSIONS

The reinforcing activity of mineral fillers modified with organo-functional derivatives was investigated in order to improve the processing and performance characteristics of filled natural rubber compounds. The influence of cation exchange capacity of mineral fillers, concentration and size of the particles were considered. From the results investigated so far can be summarized as follows.

It was established and experimentally confirmed that finest kaolin fractions with narrow particle size distribution possessed higher cation exchange capacity and therefore more susceptible to modification, resulted in strong reinforcing effect. Improved physico-mechanical properties of vulcanizates confirmed benefit of modification of fine grained clay fines, which can be used as a fairly good substitution for imported reinforcing fillers.

The higher the cation exchange capacity of kaolin the more was the effect of modification on physico-mechanical properties of kaolin-rubber composites.




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Modification of kaolin with thiourea was the most effective in virtue of formation of chemical bounds across rubber- thiourea modified kaolin interface.

The comparison indicated that in some commercial Natural Rubber compounds it would be possible to replace carbon black completely or significantly reduce its quantity in combination with thiourim activated fine ground rubber grade kaolin without any deterioration in compound performance.

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Appendices

Appendices 1

Kaolin is a Hydrated Aluminium Silicate mineral of definite chemical composition having the general formula $Al_2O_3 \cdot 2SiO_2 \cdot 2H_2O$. Technical data were obtained from Sri Lanka Ceramic Ltd. Piliyandala.

Chemical composition and properties are given bellow.

Silicon dioxide (SiO_2) content	: 45.82%
Aluminium oxide (Al_2O_3) content	: 38.78%
Ferrous oxide (Fe_2O_3) content	: 0.39%
Titanium oxide (TiO_2) content	: 0.79%
Calcium oxide (CaO) content	: 0.13%
Magnesium oxide (MgO) content	: Traces
Sodium oxide (Na_2O) content	: 0.29%
pH	: 5.6
Moisture content	: 2.0%
General plasticity	: Good



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Appendices 2

Technical characterizations of Kaolinite processed in Seethawaka refinery.

Chemical Analysis of experimental kaolinite:

Silicon dioxide (SiO_2) content	: 63.43%
Aluminium oxide (Al_2O_3) content	: 17.89%
Potassium oxide (K_2O) content	: 13.49%
Sodium oxide (Na_2O) content	: 2.51%
Iron oxide content	: 0.17%
Magnesium oxide (MgO) content	: Trace
pH	: 5.8
Moisture	: 0.5%

Appendices 3

Technical data of Quartz obtained from Seethawaka refinery.

Silicon dioxide (SiO ₂) content	: 96.00%
Aluminium oxide (Al ₂ O ₃) content	: 1.74%
Iron oxide content	: 0.02%
Potassium oxide (K ₂ O) content	: Trace
Sodium oxide (Na ₂ O) content	: Trace
Iron oxide content	: Trace
Magnesium oxide (MgO) content	: Trace
pH	: 7
Moisture content	: 0.5%



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