

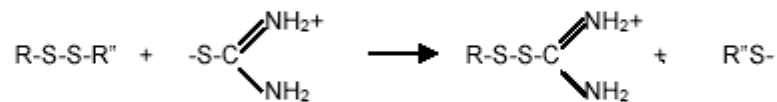
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Use of thiourea modified clay as a rubber reinforcing agent

Activation of kaolin clay is of great importance for local rubber industry as it gives a real opportunity to use cheap local mineral resources for substitution of expensive imported fillers.

In suggested research activation process concerned specifically with exchangeable cations in kaolin structure that were replaced in the course of ion-exchange reaction with thiourium cations.

The mechanism of activation was based on the fact that $=\text{NH}_2^+$ groups included in thiourium cations formed sufficiently strong and stable bonds with net negative charges on the kaolin surface. On the other side thiourea in an ionic form was capable of nucleophilic attack of S-S bounds according to reaction:



Formed reactive radicals caused fast cross-linking of double bounds of hydrocarbon polymer chain grafting the rubber fragments to the filler surface similar to action of carbon blacks, the best overall reinforcing filler known.

DTA and DTG confirmed the course of ion-exchange reaction. The low-temperature endothermic peak occurred with both samples and was caused by evolution of water absorbed by kaolin. Exothermic peak was fixed with modified kaolin only and could be attributed to rupture of ionic thiourea-kaolin bonds. DTG curve showed the loss of the sample weight at the same temperature that could be associated with evolution of thiourea degradation products. The bound rubber content test indicated increased amount of rubber grafted to activated kaolin. Reduction in the cure time was associated with acceleration action of thiourium cations, attached to kaolin surface.