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Ion-exchange process to activate the rubber grade kaolin

Kaolin clay a non-reinforcing filler is originally used as a diluent in rubber compounds to reduce their cost. Ion-exchange properties of Kaolin were used to convert its unusually inert structure into active one towards rubber polymer in order to improve performance of kaolin filled rubber compounds. Ion-exchange process concerned specifically with counter cations strongly attached to unbalanced ions at the edges of planer surfaces of kaolinite minerals.

These cations were replaced by leaching the clay with basic organic electrolytes dissociated in aqueous medium. Chosen exchangeable cations' structure included active functional groups, that internsified attraction of rubber polymer to filler surface by means of better compatibility of organic filler with organic rubber or formation of sufficiently strong adhesion bonds across rubber-kaolin interface.

Swelling test results of rubber compounds filled with activated kaolin displayed increased bound rubber content. Mooney and Monsanto rheographs showed increase in vulcanization rate. Differential Thermal Analysis test recorded the endo thermal peaks on the thermograph curves that supported interaction between rubber and activated kaolin.

Physico-mechnical properties of tested rubber compounds containing modified kaolin were found to be better in tensile abrasion and flex racking. The conclusions can be made:

1. Ion-exchange process could be successfully used for activation of rubber grade kaolin.
2. Developed modification upgraded low-cost reinforcing filler to obtain creditable performance as could be achieved with expensive reinforcing fillers in rubber compounds.