

Thesis Title      STUDY OF THE PREPARATION OF CHLORINATED  
                         NATURAL RUBBER FOR INDUSTRIAL PRODUCTION

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#### ABSTRACT

Studies were made on the chlorination of various types of natural rubber (NR) by different methods, in order to evaluate the possibility of developing the production of commercial chlorinated natural rubber (CNR). Two methods of chlorination were studied, viz. chlorination in rubber solution and in latex. The types of NR evaluated as possible sources of starting raw materials for the production of CNR included commercial smoked sheet, scraped rubber and purified NR, partial or wholly. Attention was given to the effects of nonrubber constituents (mainly proteins and lipids) of NR on chlorination reaction and the resulting products.

The studies showed that chlorination in NR latex is not a suitable method for commercial preparation of CNR as it yields products having low chlorine content (30-40 % by weight) and unacceptable thermal stability. Chlorination in rubber solution, using carbontetrachloride as solvent, the reaction temperature of 78°C and the reaction time between 21 - 24 hours, on the otherhand gives CNR having comparable properties to those of commercial CNR in most respects. The chlorine contents reached were 63 - 65 % by weight, depending on the types of starting NR.

Nonrubber constituents of NR appear to have little effects on the final properties of CNR, except for thermal stability where their presence impart an improvement, but retards the rate of chlorination during the initial stage of the reactions. Thus, it appears that all types of NR studied, except scrapped rubber, may be used as starting materials for the preparation of CNR.

Preliminary study was also made to chlorinate liquid NR ( molecular weight 6,000 - 7,000 ), in order to extend the potential source of raw materials for CNR production. The results attained showed that chlorination

of this type of material is possible but only when they are thoroughly purified. No significant chlorination was observed to take place with unpurified liquid NR. The product, however, retain the soft and ductile characteristics of low molecular weight polymers.