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Thesis Title Effect of Non-rubber Constituents on Vulcanisation Behaviour and
 Properties of Natural Rubber Vulcanisates

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ABSTRACT

The objective of the present studies is to make further contribution to the knowledge of the effects of the non-rubber substances on the cure behaviour, structures and properties of natural rubber vulcanisates, with the view to reduce inconsistency of natural rubber. Five types of NR samples were prepared for this study, viz. acid coagulated NR (ANR), whole NR (WNR), acetone-extracted NR (ENR), deproteinised NR (DPNR) and purified NR (PNR). The results showed that ANR sample showed the largest variations in cure behaviour, while WNR and PNR samples exhibited relatively consistent vulcanisation properties. The results confirmed that non-rubber compounds have accelerating effect on vulcanisation reactions of NR. Therefore, exact control of the amount of these non-rubbers in the NR sample must be exercised if variation in the cure behaviour of NR is to be reduced. Complete removal of the non-rubbers (purified NR sample) or leaving them intact (whole NR sample) might provide alternative means for solving the inconsistency problem of NR. Study on the effects of non-rubbers on the network structures of NR vulcanisates showed that non-rubber compounds although had obvious influences on the cure time of NR, have no effect on the types and amounts of crosslinks formed in the CV

vulcanisate system cured by using CBS as accelerators. Thus the physical properties were essentially unchanged. However, for the EV system, the absence of non-rubbers caused uniform distribution of mono-, di-, polysulphidic crosslinks. Although strength properties of these rubber vulcanisates remained largely unchanged, the spread out of crosslink type resulted in improvement of flex-cracking properties observed for DPNR and PNR.