

Thesis Title The Study of Non-Catalytic Hydrogenation of
Polyisoprenes
Name Chuleeporn Thanomsilp
Degree Master of Science (Polymer Science)
Thesis Supervisory Committee
 Saran Poshyachinda, Ph.D.
 Krisda Suchiva, Ph.D.
 Pranee Phinyocheep, Doctorat de l' Université du Maine
Date of Graduation 6 May B.E.2540 (1997)

ABSTRACT

Hydrogenation of various polyisoprenes (synthetic cis-PI, synthetic trans-PI and natural rubber) was studied. Non-catalytic hydrogenation was employed and *p*-toluenesulphonylhydrazide (TSH) was selected as hydrogenating agent which undergoes thermal decomposition to give diimide, the active species which allows hydrogens to double bond in polymer. A series of [TSH]/[C=C] ratio was varied to study the extent of hydrogenation. FT-Raman spectroscopy was used to calculate the percentage hydrogenation. From FT-Raman and FT-NMR spectra, complete hydrogenation could be obtained when [TSH]/[C=C] ratio is equal to 4.0. However, the results from GPC showed that hydrogenated products had lower molar mass and broader molar mass distribution than those of the starting polyisoprenes. This indicated that chain cleavage occurred during hydrogenation. TGA and DSC results confirm that thermal stability and oxidative resistance of hydrogenated products are superior to those of the starting polyisoprenes.

Surface hydrogenation of natural rubber vulcanizate was also investigated. Hydrogenation was carried out by controlled immersion of NR vulcanizate in xylene and butanol mixtures. The mechanical properties and thermal properties of the hydrogenated products were found to be inferior to those of the untreated vulcanizates.