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MECHANICAL PROPERTIES OF NATURAL RUBBER/NANOCALCIUM
CARBONATE COMPOSITES

Miss Wilairat Chuafak

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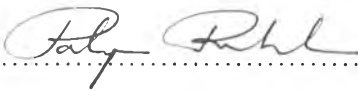
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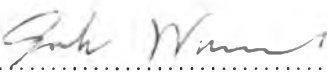
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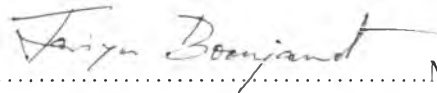

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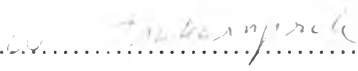
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คอมโพสิตยางธรรมชาติ/นาโนแคลเซียมคาร์บอเนตได้ถูกเตรียมขึ้นโดยใช้เครื่องบดผสมสองลูกกลิ้งและเครื่องอัดขึ้นรูปเพื่อศึกษาสมบัติเชิงกล ตัวแปรที่ศึกษา ได้แก่ ขนาดอนุภาคของแคลเซียมคาร์บอเนต การเคลือบผิวของสารตัวเติม และปริมาณสารตัวเติม ทำการเปรียบเทียบการเสริมแรงของนาโนแคลเซียมคาร์บอเนตกับสารตัวเติมเสริมแรง เขม่าดำและซิลิกา ผลการศึกษาพบว่าเวลาในการคงรูปของคอมโพสิตยางกับนาโนแคลเซียมคาร์บอเนตที่มีการเคลือบผิวลดลงและมีค่าต่ำกว่าคอมโพสิตของนาโนแคลเซียมคาร์บอเนตที่ไม่มีการเคลือบผิวและแคลเซียมคาร์บอเนตขนาดอนุภาค 2 ไมโครเมตร เนื่องจากการผสมเข้ากันได้ดีระหว่างสารตัวเติมและไฮโดรโฟบิคพอลิเมอร์ การปรับปรุงการเคลือบผิวเพื่อการกระจายตัวสามารถยืนยันจากผลของสัณฐานวิทยา เมื่อทำการเปรียบเทียบลักษณะการคงรูปของคอมโพสิตยางธรรมชาติ/นาโนแคลเซียมคาร์บอเนตกับสารตัวเติมซิลิกา พบว่ามีเวลาในการคงรูปของยางต่ำกว่าอย่างชัดเจน เมื่อทำการศึกษาสมบัติเชิงกลของคอมโพสิตยางธรรมชาติ/นาโนแคลเซียมคาร์บอเนตชนิดที่มีการเคลือบผิวพบว่าให้ค่าการเสริมแรงและยังคงสมบัติการยึดตัวของยางอยู่ซึ่งสามารถประยุกต์ใช้เป็นประโยชน์ในงานยางผสมสีได้

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WILAIRAT CHUAFK: MECHANICAL PROPERTIES OF NATURAL RUBBER/ NANOCALCIUM CARBONATE COMPOSITES. THESIS

ADVISOR: PROF. PATTARAPAN PRASASSARAKICH, Ph.D., THESIS

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Natural rubber/nanocalcium carbonate composite was prepared by two-roll mill and compression molding. The mechanical properties of rubber composites were investigated. The variables were particle size of calcium carbonate, filler coatings and filler loading. The reinforcement by nanocalcium carbonate was compared with carbon black and silica. It was found that the curing time of coated nanocalcium carbonate rubber composite was reduced and lower than that of uncoated nanocalcium carbonate and 2 μ -calcium carbonate composite according to a good compatibility between the fillers and hydrophobic polymer. The modification of properties for dispersing the fillers was coating surface, which was confirmed by morphology. The cure characteristics of rubber filled with nanocalcium carbonate exhibit the lower values than that filled with silica. The mechanical properties of the coated nanocalcium carbonate exhibited the reinforcing effect while retained the elasticity of the elastomer, which is very useful for the color rubber application.

Field of study.....Petrochemistry and polymer science.....Student's signature.....
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LIST OF ABBREVIATIONS

°C	:	Degree Celsius
g.	:	gram
kg	:	Kilogram
mg	:	Milligram
MW	:	Molecular Weight
µm	:	Micrometer
%wt	:	Percent by weight
avg	:	Average
nm	:	Nanometer
phr	:	Part per hundred
ASTM	:	The American Society for Testing and Material
TEM	:	Transmission electron microscopy
SEM	:	Scanning electron microscopy
MBTS	:	2-2'- dithiobisbenzothiazole
DPG	:	Diphenylguanidine
FT-IR	:	Fourier-transform infrared spectroscopy
hr	:	Hour