

การสังเคราะห์สารเชื่อมโยงบางชนิดที่มีหมู่ฟังก์ชันหลายหมู่สำหรับพอลิยูรีเทน

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**SYNTHESIS OF SOME MULTIFUNCTIONAL CROSSLINKING AGENTS  
FOR POLYURETHANE**

**Mr. Nawee Farkrachang**

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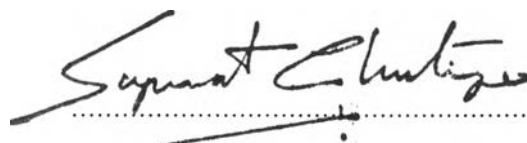
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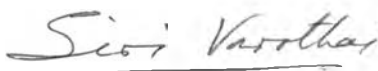
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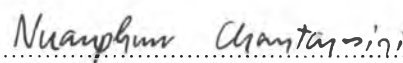
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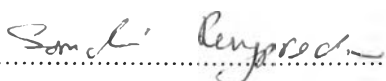
  
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## พิมพ์ต้นฉบับบทคัดย่อวิทยานิพนธ์ภายในกรอบสี่เหลี่ยมนี้เพียงแผ่นเดียว

นางวี พ้ากระจ่าง : การสังเคราะห์สารเชื่อมโยงบางชนิดที่มีหมู่ฟังก์ชันหลายหมู่สำหรับพอลิยูรีเทน

(SYNTHESIS OF SOME MULTIFUNCTIONAL CROSSLINKING AGENTS FOR POLYURETHANE)

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สารประกอบ 5 ตัว คือ Bis-(3-allyloxy-2-hydroxy-1-propoxy)diphenoxypropane (3), Bis-[3-(4-allyloxy-2-methoxy)phenoxy-2-hydroxy-1-propoxy]diphenoxypropane (7), 2,7-Bis-(3-allyloxy-2-hydroxy-1-propoxy)naphthalene (9), Bis-(3-N,N-diallylamino-2-hydroxy-1-propoxy)diphenoxypropane (11) และ N,N,N',N'-tetrakis-(3-allyloxy-2-hydroxy-1-propoxy)ethylenediamine (13) เตรียมได้จากการเปิดวงอีพอกไซด์ด้วยนิวคลีโอไฟล์ สารประกอบ (7) และ (11) เตรียมได้จากปฏิกิริยาระหว่าง diglycidyl ether of bisphenol A (6) กับ eugenol (5) และ diallylamine (10) ตามลำดับ สารประกอบ (3), (9), และ (13) เตรียมได้จากปฏิกิริยาระหว่าง allyl glycidyl ether (2) กับ bisphenol-A (1), 2,7-dihydroxynaphthalene (8) และ ethylenediamine (12) ตามลำดับ สารประกอบเหล่านี้ประกอบด้วยหมู่ไฮดรอกซีและหมู่ไวโนลหลายหมู่ ซึ่งสามารถพิสูจน์เอกลักษณ์โดยเทคนิค  $^1\text{H}$  NMR และ  $^{13}\text{C}$  NMR สเปกโตรสโกปี, อินฟราเรด สเปกโตรสโกปี, แมสสเปกโตรเมตรี และการวิเคราะห์ปริมาณธาตุองค์ประกอบ จากการศึกษาปฏิกิริยาของหมู่ไฮดรอกซีและหมู่ไวโนลของสารประกอบ (3), (9), (11) และ (13) พบว่าหมู่ไฮดรอกซีของสารประกอบ (3), (9), (11) และ (13) สามารถเกิดปฏิกิริยากับหมู่ไอโซไซยาเนตของ MDI ได้เป็นพันธะยูรีเทนเชื่อมโยง และหมู่ไวโนลของสารประกอบ (3), (9), (11) และ (13) สามารถเกิดปฏิกิริยาแบบฟรีแรดิคัล เมื่อมี benzoyl peroxide อยู่ด้วย จากผลดังกล่าวสรุปได้ว่า อาจนำสารประกอบ (3), (9), (11) และ (13) มาใช้เป็นสารเชื่อมโยงได้สำหรับการเตรียมพอลิยูรีเทน อีลาสโตเมอร์

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ลายมือชื่ออาจารย์ที่ปรึกษา ..... นवलพรรณ จันทศิริ  
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NAWEE FARKRACHANG : SYNTHESIS OF SOME MULTIFUNCTIONAL  
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Five compounds, Bis-(3-allyloxy-2-hydroxy-1-propoxy)diphenoxypropane (3), Bis-[3-(4-allyloxy-2-methoxy)phenoxy-2-hydroxy-1-propoxy]diphenoxypropane (7), 2,7-Bis-(3-allyloxy-2-hydroxy-1-propoxy)naphthalene (9), Bis-(3-N,N-diallylamino-2-hydroxy-1-propoxy)diphenoxypropane (11) and N,N,N',N'-tetrakis-(3-allyloxy-2-hydroxy-1-propoxy)ethylenediamine (13) were synthesized by ring opening of epoxides with nucleophiles. Compounds (7) and (10) were synthesized by the reaction of diglycidyl ether of bisphenol A (6) with eugenol (5) and diallylamine (10), respectively. Compounds (3), (9), and (13) were obtained from the reaction of allyl glycidyl ether (2) with bisphenol-A (1), 2,7-dihydroxynaphthalene (8) and ethylenediamine (12), respectively. These compounds, which contain multiple hydroxyl and vinyl groups, were characterized by <sup>1</sup>H NMR and <sup>13</sup>C NMR spectroscopy, mass spectrometry, infrared spectroscopy and elemental analysis. The reactivity of the hydroxyl and vinyl groups of compounds (3), (9), (11), and (13) were studied. It was found that the hydroxyl groups of compounds (3), (9), (11), and (13) could react with the isocyanate group of MDI to give a urethane linkage. It was also found that the vinyl groups of compounds (3), (9), (11), and (13) can undergo free radical reactions in the presence of benzoyl peroxide. These results suggest that compounds (3), (9), (11), and (13) may be used as crosslinking agents in the preparation of polyurethane elastomers.

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สาขาวิชา เคมี

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ลายมือชื่อนิติกร

ลายมือชื่ออาจารย์ที่ปรึกษา รวณภพ จันทารศิริ

ลายมือชื่ออาจารย์ที่ปรึกษาร่วม



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Nawee Farkrachang

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Analysis calc.	Analysis calculation
$^{13}\text{C}$ NMR	Carbon-13 Nuclear Magnetic Resonance
$\text{cm}^{-1}$	unit of wavenumber
d	doublet
dd	double doublet
DGEBA	Diglycidyl ether of bisphenol A
DSC	Differential Scanning Calorimetry
FT-IR	Fourier Transform Infrared Spectroscopy
$^1\text{H}$ NMR	Proton Nuclear Magnetic Resonance
IPNs	Interpenetrating Polymer Networks
IR	Infrared
J	coupling constant
m	multiplet
$\text{M}^+$	Molecular ion in mass spectrum
MDI	4,4'-diphenylmethane diisocyanate
MS	Mass spectrometry
ppm	parts per million
$R_f$	retention factor in chromatography
s	singlet
tdd	triple double doublet
TLC	Thin Layer Chromatography
TGA	Thermogravimetric Analysis
$\delta$	Chemical Shift