

เอกพจน์เดชน้อยอย่างเลือกจำเพาะของแอลคีนเร่งปฏิกิริยาด้วยสารประกอบเชิงซ้อนโคบอลต์

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จุฬาลงกรณ์มหาวิทยาลัย

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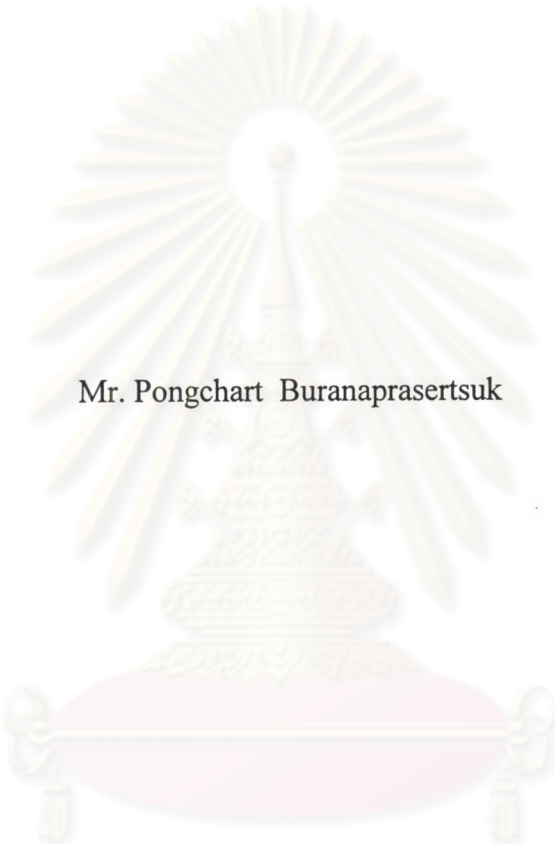
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SELECTIVE EPOXIDATION OF ALKENES CATALYZED BY COBALT COMPLEXES



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จุฬาลงกรณ์มหาวิทยาลัย

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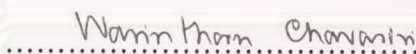
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พงศ์ชาติ บุรณะประเสริฐสุข : เอพอกซิเดชันอย่างเลือกจำเพาะของแอลคีนเร่งปฏิกิริยาด้วยสารประกอบเชิงซ้อนโคบอลต์ (SELECTIVE EPOXIDATION OF ALKENES CATALYZED BY COBALT COMPLEXES) อ. ที่ปรึกษา: ผศ. ดร.วรินทร์ ชวศิริ, 61 หน้า. ISBN 974-17-2792-5.

ได้ศึกษาปฏิกิริยาเอพอกซิเดชันอย่างเลือกจำเพาะของแอลคีนเร่งปฏิกิริยาด้วยสารประกอบเชิงซ้อนโคบอลต์ที่มี 2-ethylbutyraldehyde/O<sub>2</sub> อยู่ด้วยโดยใช้ไซโคลเฮกซีนเป็นสารต้นแบบ ได้ไซโคลเฮกซีนออกไซด์เป็นผลิตภัณฑ์หลักในปริมาณสูงและมีความเลือกจำเพาะที่ดีมาก ตัวแปรหลักที่มีผลต่อปฏิกิริยา คือ ชนิดของลิแกนด์และตัวทำละลาย การใช้สารประกอบเชิงซ้อนโคบอลต์ของ calix[4]pyrrole **10** และ thiophen-*o*-phen **12** พบว่าเป็นตัวเร่งปฏิกิริยาที่เหมาะสมสำหรับเอพอกซิเดชันของแอลคีน นอกจากนี้ได้ศึกษา stereoselectivity และ regioselectivity ของระบบโดยใช้ *cis*- และ *trans*-stilbene และ 4-vinylcyclohexene เป็นสารต้นแบบ การแยกกรด 2-ethylbutanoic เป็นผลิตภัณฑ์ข้างเคียงของปฏิกิริยาให้ข้อมูลที่มีประโยชน์สำหรับกลไกการเกิดปฏิกิริยาของปฏิกิริยานี้ว่าเกิดผ่านกรดเปอร์ออกซีและกระบวนการฟรีเรดิคัล

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PONGCHART BURANAPRASERTSUK: SELECTIVE EPOXIDATION OF ALKENES CATALYZED BY COBALT COMPLEXES THESIS ADVISOR: ASSIST. PROF. WARINTHORN CHAVASIRI, Ph.D., 61 pp. ISBN 974-17-2792-5.

The selective epoxidation of alkenes catalyzed by cobalt complexes in the presence of 2-ethylbutyraldehyde/O<sub>2</sub> was examined. Cyclohexene was utilized as a chemical model and cyclohexene oxide was acquired as a major product with high yield and excellent selectivity. The parameters that had a major influence on the reaction included type of ligands and solvent. The utilization of cobalt(II) complexes of calix[4]pyrrole **10** and thiophen-*o*-phen **12** was disclosed to be appropriate catalysts for alkene epoxidation. In addition, the stereoselectivity and regioselectivity studies of the system using *cis*- and *trans*-stilbenes and 4-vinylcyclohexene, respectively as chemical probes were thoroughly investigated. The isolation of 2-ethylbutanoic acid as a by-product of the reaction was clearly provided informative clue for the mechanism of this reaction to take place *via* peroxy acid and free radical process.

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## LIST OF ABBREVIATIONS

H <sub>2</sub> DPP	2,3,5,7,8,10,12,13,15,17,18,20-dodecaphenylporphyrin
br	broad (IR)
BuLi	butyllithium
δ	chemical shift
FeTPPCL	(chloro-5,10,15,20-tetraphenylporphyrinato)iron(III)
FeTTPCL	(chloro-5,10,15,20-tetra- <i>o</i> -tolyporphyrinato)iron(III)
<i>J</i>	coupling constant (NMR)
°C	degree celsius
CDCl <sub>3</sub>	deuterated chloroform
DMD	dimethyldioxirane
DMSO	dimethylsulfoxide
d	doublet (NMR)
e	equation
GC	gas chromatography
g	gram(s)
Hz	hertz
hr	hour(s)
IR	infrared
MS	mass spectrometry
m/z	mass to charge ratio
m	medium (IR)
m.p.	melting point
TMOPP	<i>meso</i> -tetrakis(2,4,6-trimethylphenyl)porphyrin
TDCPP	<i>meso</i> -tetrakis(2,6-dichlorophenyl)porphyrin
<i>m</i> -CPBA	<i>meta</i> -chloroperbenzoic acid
mL	milliliter(s)
mmol	millimole

**LIST OF ABBREVIATIONS (CONTINUED)**

mg	milligram(s)
min	minute(s)
m	multiplet (NMR)
NMR	nuclear magnetic resonance
ppm	part per million
PTC	phase transfer catalyst
q	quartet (NMR)
R <sub>f</sub>	retardation factor
s	singlet (NMR)
s	strong (IR)
TPP	tetraphenylporphyrin
TLC	thin layer chromatography
TS	titanium silicate
t	triplet (NMR)
w	weak (IR)



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