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จุฬาลงกรณ์มหาวิทยาลัย

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SYNTHESIS AND CHARACTERIZATION OF ALKYL (METH)ACRYLATE-DIVINYLBENZENE
COPOLYMER BEADS BY SUSPENSION COPOLYMERIZATION

Miss. Ornsiri Aungsupravate



ศูนย์วิทยทรัพยากร

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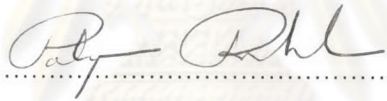
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อริศรี อังศุประเวศ : การสังเคราะห์บีดโคพอลิเมอร์แอลคิล(เมท)อะคริเลต-ไดไวนิลเบนซีนโดยการเกิดโคพอลิเมอร์แบบแขวนลอยและการตรวจลักษณะสมบัติ (SYNTHESIS AND CHARACTERIZATION OF ALKYL(METH)ACRYLATE-DIVINYLBENZENE COPOLYMER BEADS BY SUSPENSION COPOLYMERIZATION) อ. ที่ปรึกษา : ศ. ดร. สุดา เกียรติกำจร วงศ์, อ.ที่ปรึกษาร่วม : ผศ. ดร. วรินทร์ ชวศิริ; 178 หน้า. ISBN 974-17-5928-2.

ได้สังเคราะห์บีดโคพอลิเมอร์เมทิลเมทาคริเลต-ไดไวนิลเบนซีน หรือบิวทิลเมทาคริเลต-ไดไวนิลเบนซีนด้วยวิธีการเกิดพอลิเมอร์แบบแขวนลอย โดยมีเบนโซอิลเพอร์ออกไซด์และพอลิไวนิลแอลกอฮอล์เป็นตัวริเริ่มปฏิกิริยาแบบอนุโมลอิสระและสารแขวนลอย ตามลำดับ ได้ศึกษาตัวแปรต่างๆ ที่มีผลต่อสัณฐานวิทยาและความสามารถในการดูดซึมโทลูอินและน้ำมันเครื่องของบีดโคพอลิเมอร์ ได้แก่ อัตราส่วนของวัฏภาคมอนอเมอร์ต่อวัฏภาคน้ำ ความเข้มข้นของตัวริเริ่มปฏิกิริยา ความเข้มข้นของตัวเชื่อมขวาง ความเข้มข้นของสารแขวนลอย เวลาในการทำปฏิกิริยา อุณหภูมิในการทำปฏิกิริยาและองค์ประกอบของตัวเจือจาง ได้ศึกษาจลนศาสตร์ของตัวทำละลายเข้าสู่บีดโคพอลิเมอร์เมทิลเมทาคริเลต-ไดไวนิลเบนซีนเพื่อหาชนิดของการแพร่

กลไกการเคลื่อนที่ของโทลูอินเข้าสู่บีดโคพอลิเมอร์เมทิลเมทาคริเลต-ไดไวนิลเบนซีนเป็นแบบวีนนอนฟิกเกียนชนิดที่ 2 ซึ่งเป็นกระบวนการผ่อนคลายของโซ่โมเลกุลของพอลิเมอร์ ได้เพิ่มโคมอนอเมอร์ชนิดที่สาม ได้แก่ บิวทิลเมทาคริเลต ลอริลเมทาคริเลต สเตียริลอะคริเลต และโดเดซิลอะคริเลต เพื่อปรับปรุงความสามารถในการดูดซึมโทลูอินและน้ำมันเครื่องของบีดโคพอลิเมอร์เมทิลเมทาคริเลต-ไดไวนิลเบนซีน อัตราส่วนการบวมตัวในโทลูอินของบีดโคพอลิเมอร์เมทิลเมทาคริเลต-ไดไวนิลเบนซีน-บิวทิลเมทาคริเลตอยู่ในพิสัย 25 เท่าโดยปริมาตร และผลกระทบของโคมอนอเมอร์ชนิดที่สามต่อความสามารถในการดูดซึมน้ำมันเครื่องของบีดโคพอลิเมอร์เมทิลเมทาคริเลต-ไดไวนิลเบนซีน พบว่าความสามารถในการดูดซึมน้ำมันเครื่องเพิ่มขึ้นเมื่อความไม่มีขั้วของโคมอนอเมอร์ชนิดที่สามเพิ่มขึ้น

ภาควิชา-

สาขาวิชาปิโตรเคมีและวิทยาศาสตร์พอลิเมอร์

ปีการศึกษา 2547

ลายมือชื่อนิสิต..... อริศรี อังศุประเวศ.....

ลายมือชื่ออาจารย์ที่ปรึกษา..... ผศ. ดร. วรินทร์ ชวศิริ.....

ลายมือชื่ออาจารย์ที่ปรึกษาร่วม..... ผศ. ดร. อริศรี อังศุประเวศ.....

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KEY WORD: SUSPENSION POLYMERIZATION / ALKYL (METH)ACRYLATE / SWELLING / ABSORBENT / SOLUBILITY PARAMETER / FICKIAN DIFFUSION

ORNSIRI AUNGSUPRAVATE: SYNTHESIS AND CHARACTERIZATION OF ALKYL (METH)ACRYLATE-DIVINYLBENZENE COPOLYMER BEADS BY SUSPENSION COPOLYMERIZATION. THESIS ADVISOR: PROF. SUDA KIATKUMJORNWONG, Ph.D., THESIS COADVISOR: ASST. PROF. WARINTHORN CHAVASIRI, Ph.D., 178 pp. ISBN 974-17-5928-2.

Methyl methacrylate-divinylbenzene or butyl methacrylate-divinylbenzene copolymer beads were synthesized by suspension polymerization. The reactions were performed in the presence of benzoyl peroxide and poly(vinyl alcohol) as a radical initiator and suspending agent, respectively. The monomer phase weight fraction, initiator concentration, crosslinking agent concentration, suspending agent concentration, reaction time, reaction temperature and diluent composition were studied for the morphology of the resultant copolymer beads and the capacity of toluene and lube oil uptake. The kinetic of toluene uptake of methyl methacrylate-divinylbenzene copolymer bead was studied to validate the diffusion type.

The transport mechanism of toluene into the spherical bead copolymer of methyl methacrylate-divinylbenzene was non-Fickian case II type which was a relaxation control of the polymer molecules. The addition a third monomer of alkyl (meth)acrylates, namely, butyl methacrylate, lauryl methacrylate, stearyl acrylate and dodecyl acrylate was used to improve the toluene and oil absorbency of the terpolymer beads. The highest capacity of toluene absorption by methyl methacrylate-divinylbenzene-butyl methacrylate terpolymer was 25 times of their original volume. The effect of the third-copolymer on oil absorbency of methyl methacrylate-divinylbenzene copolymer indicated that the oil capacity of terpolymer beads increased with the increasing hydrophobicity of the third-comonomer.

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