

การปรับปรุงวัสดุพิมพ์พื้นฐานเซลลูโลสโดยกราฟท์โคโพลิเมอไรเซชัน
ของอะครีโลไนไตรลและกรดอะคริลิก บนไมโครคริสตัลไลน์เซลลูโลส



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จุฬาลงกรณ์มหาวิทยาลัย

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IMPROVEMENT OF CELLULOSE-BASED WATER-RETAINING MATERIAL
BY GRAFT COPOLYMERIZATION OF ACRYLONITRILE AND ACRYLIC
ACID ON MICROCRYSTALLINE CELLULOSE



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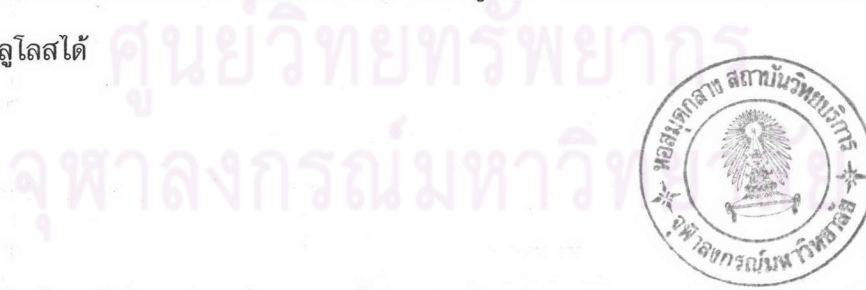
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ปัญหา นาคพงศ์ : การปรับปรุงวัสดุอุ้มน้ำพื้นฐานเซลลูโลสโดยกราฟท์โคโพลิเมอร์ไรเซชันของ
อะครีโลไนไตรลและกรดอะครีลิก บนไมโครคริสตัลไลน์เซลลูโลส (IMPROVEMENT OF
CELLULOSE-BASED WATER-RETAINING MATERIAL BY GRAFT COPOLYMERIZATION
OF ACRYLONITRILE AND ACRYLIC ACID ON MICROCRYSTALLINE CELLULOSE)

อ.ที่ปรึกษา : รศ.ดร.ศุภวรรณ ตันตยานนท์, 163 หน้า. ISBN 974-583-108-5

ในงานวิจัยนี้ได้สังเคราะห์โพลิเมอร์ที่มีความสามารถดูดซับน้ำได้สูงจากเซลลูโลสโดยการกราฟท์
โคโพลิเมอร์ไรเซชันของอะครีโลไนไตรลและกรดอะครีลิกบนเซลลูโลส ด้วยตัวเริ่มปฏิกิริยาซีริกแอมโมเนียม
ไนเตรดภายใต้บรรยากาศของไนโตรเจน เนื่องจากไมโครคริสตัลไลน์เซลลูโลสเป็นรูปแบบที่สามารถเกิด
กราฟท์โคโพลิเมอร์ไรเซชันได้ดี จึงใช้ไมโครคริสตัลไลน์เซลลูโลสในการวิจัยนี้ โพลิเมอร์ที่เกิดขึ้นถูก
กำจัดออกโดยการสกัดด้วย เอ็น, เอ็น-ไดเมทิลฟอร์มามิด แล้วจึงนำผลิตภัณฑ์กราฟท์โคโพลิเมอร์ที่บริสุทธิ์
ไปไฮโดรไลส์ในสารละลายไฮเดียมไฮดรอกไซด์ที่อุณหภูมิ 95°C ซึ่งผลิตภัณฑ์ที่ได้มีความสามารถในการ
ดูดซับน้ำได้สูงประมาณ 1056 เท่าน้ำหนักโพลิเมอร์ ดังนั้นจึงได้ทำการศึกษาปัจจัยต่าง ๆ ที่มีผลต่อ
ปฏิกิริยาการกราฟท์เพื่อหาสภาวะที่เหมาะสมที่สุดต่อการเกิดปฏิกิริยาได้แก่ ปริมาณน้ำและปริมาณโมโนเมอร์
ทั้งสองชนิด ความเข้มข้นของตัวเริ่มปฏิกิริยาและกรดไนตริก อัตราเร็วในการคนและอุณหภูมิ โพลิเมอร์ที่
สังเคราะห์ได้ในแต่ละขั้นตอนจะถูกตรวจสอบเอกลักษณ์โดยอินฟราเรดสเปกโตรสโกปีรวมทั้งได้หาน้ำหนัก
โมเลกุลของสายโซ่โพลิเมอร์โดยใช้ปฏิกิริยาการไฮโดรไลส์ด้วยกรด และได้ทดสอบคุณสมบัติทางกายภาพของ
วัสดุอุ้มน้ำที่ได้ นอกจากนี้ได้ทดลองทำไซยาโนเอทิลเลชันและกราฟท์โคโพลิเมอร์ไรเซชันของอะครีโลไนไตรล
และไฮเดียมอัลลิซัลไฟเนตบนไมโครคริสตัลไลน์เซลลูโลส พบว่าทั้งสามวิธีนี้ไม่สามารถเตรียมวัสดุอุ้มน้ำ
พื้นฐานเซลลูโลสได้



ภาควิชา ... สหสาขาวิชาปิโตรเคมี-โพลิเมอร์.....
สาขาวิชา ... ปิโตรเคมี.....
ปีการศึกษา ... 2535.....

ลายมือชื่อนิสิต ปัญ นาคพงศ์.....
ลายมือชื่ออาจารย์ที่ปรึกษา อ.ดร.ศุภวรรณ.....
ลายมือชื่ออาจารย์ที่ปรึกษาร่วม



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KEY WORD: MICROCRYSTALLINE CELLULOSE/WATER-RETAINING MATERIAL

PIYANUT NAKPONG : IMPROVEMENT OF CELLULOSE-BASED WATER-RETAINING

MATERIAL BY GRAFT COPOLYMERIZATION OF ACRYLONITRILE AND ACRYLIC

ACID ON MICROCRYSTALLINE CELLULOSE. THESIS ADVISOR : ASSO. PROF.

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The present research concerns the synthesis of polymer with high absorbency by graft copolymerization of acrylonitrile and acrylic acid on microcrystalline cellulose using ceric ammonium nitrate as an initiator under nitrogen atmosphere. Microcrystalline cellulose which was the most suitable form of cellulose for grafting was used. Homopolymers were removed by extraction with N,N-dimethylformamide and the pure graft-copolymer was subsequently hydrolyzed in sodium hydroxide solution at 95°C. This polymer product could absorb distilled water 1056 times of its weight. Thus the effect of amount of water, quantity of two monomers, concentration of ceric ammonium nitrate and nitric acid, stirring speed, and temperature on graft copolymerization were studied in order to determine the optimum condition of this synthesis. The synthesized polymer were characterized by the Infrared Spectroscopy. The molecular weight of grafted side chain was determined after acid hydrolysis reaction and the physical testing of water-retaining material was done. In addition, cyanoethylation and graft copolymerization of acrylonitrile and, sodium allyl sulfonate on microcrystalline cellulose were attempted. However, cellulose-based water-retaining material could not be achieved by these methods.

ภาควิชา.....PETRO-POLYMER INTERPROGRAM

สาขาวิชา.....PETROCHEMISTRY

ปีการศึกษา.....2535

ลายมือชื่อนิสิต..... ปิยนุช นาคพงษ์

ลายมือชื่ออาจารย์ที่ปรึกษา..... สุปawan ทานตายนอน

ลายมือชื่ออาจารย์ที่ปรึกษาร่วม.....

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