

# LIGNOCELLULOSIC BIOMASS PRETREATED WITH IONIC LIQUID

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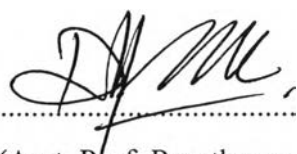
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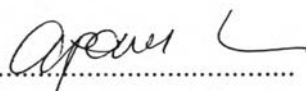
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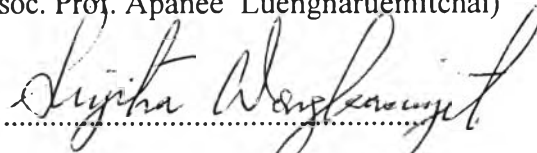


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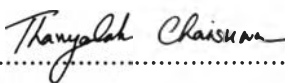
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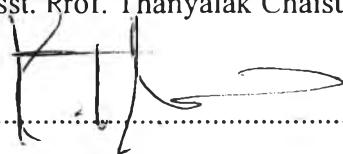
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## ABSTRACT

5671030063    Petrochemical Technology Program  
Rinrat Wanapiroom: Lignocellulosic Biomass Pretreated with Ionic  
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methodology

Lignocellulosic biomass can be used to produce fermentable sugar, which is used in the production of biofuels. However, enzymatic action is hindered by the recalcitrance of plant cell walls. Among the chemicals used in the pretreatment of biomass, acid can give high glucose yield; however, it can also form inhibitors. To solve these problems, a new method is being used to improve the total sugar concentration by adding acid as a catalyst during ionic liquid pretreatment. This research focused on a suitable composition of Napier grass, the effect of acid type, acid concentration, pretreatment time, biomass loading and temperature during ionic liquid pretreatment. The optimal condition of these variables were determined by response surface methodology (RSM) for producing maximum reducing sugar. The result showed that maximum reducing sugar concentration of 14.38 g/l was derived when Pakchong1\_Kanchanaburi (Leaf) was pretreated by 1-Ethyl-3-methylimidazolium acetate and acetic acid at 147 °C, 76 min, acid 1.287 volume% and biomass loading of 20 g/l.

## บทคัดย่อ

รินรัตน์ วนาภิรมย์: การปรับสภาพลิกโนเซลลูโลสโดยใช้ของเหลวไอออนิก (Lignocellulosic Biomass Pretreated with Ionic Liquid) อ. ที่ปรึกษา : รศ. ดร. อาภาณี เหลืองนฤมิตชัย และ รศ. ดร. สุจิตรา วงศ์เกษมจิตต์ 88 หน้า

ลิกโนเซลลูโลสสามารถใช้เป็นวัตถุดิบในการผลิตน้ำตาล เพื่อนำไปใช้ในการผลิตเชื้อเพลิงชีวภาพ แต่เนื่องจากการป้องกันของผนังเซลล์ ทำให้เอนไซม์ไม่สามารถเข้าไปทำปฏิกิริยากับเซลลูโลสได้ โดยทั่วไปสารเคมีประเภทกรดเป็นทางเลือกหนึ่งที่ใช้ในการปรับสภาพชีวมวลและให้ปริมาณน้ำตาลสูง อย่างไรก็ตามทำให้เกิดสารยับยั้งในกระบวนการหมัก ดังนั้นวิธีใหม่ที่ใช้เพิ่มความเข้มข้นของน้ำตาลคือ การเติมกรดเป็นตัวเร่งปฏิกิริยาในการปรับสภาพด้วยของเหลวไอออนิก ในงานวิจัยนี้ศึกษาองค์ประกอบที่เหมาะสมของหญ้าเนเปียร์, ผลกระทบของชนิดกรด, ความเข้มข้นของกรด, ปริมาณชีวมวล, เวลาและอุณหภูมิในการปรับสภาพ จากตัวแปรดังกล่าว ค่าที่ดีที่สุดที่ทำให้ได้น้ำตาลสูง สามารถหาโดยวิธีการแสดงผลตอบสนองแบบโครงร่างพื้นผิวหรือ RSM ซึ่งได้ความเข้มข้นของน้ำตาลจากไบโหญ้าเนเปียร์พันธุ์ปากช่อง 1 (จังหวัดกาญจนบุรี) เท่ากับ 14.38 กรัมต่อลิตร เมื่อใช้ของเหลวไอออนิกชนิด 1 - เอทิล - 3 - เมทิลอิมิดาโซเลียมอะซิเตท และกรดอะซิติก 1.287 เปอร์เซ็นต์โดยปริมาตร เป็นตัวเร่งปฏิกิริยา ที่อุณหภูมิ 147 องศาเซลเซียส เป็นเวลา 76 นาที โดยใช้หญ้า 20 กรัมต่อลิตรของสารละลาย

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