

**BIODIESEL PRODUCTION FROM PALM OIL USING  
KOH/BENTONITE CATALYST**

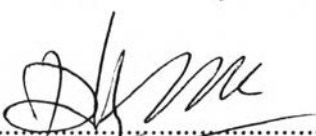
Chesta Jindavat

A Thesis Submitted in Partial Fulfilment of the Requirements  
for the Degree of Master of Science  
The Petroleum and Petrochemical College, Chulalongkorn University  
in Academic Partnership with  
The University of Michigan, The University of Oklahoma,  
Case Western Reserve University, and Institut Français du Pétrole  
2011


**Thesis Title:** Biodiesel Production from Palm Oil Using KOH/bentonite  
Catalyst  
**By:** Chesta Jindavat  
**Program:** Petrochemical Technology  
**Thesis Advisors:** Asst. Prof. Apanee Luengnaruemitchai  
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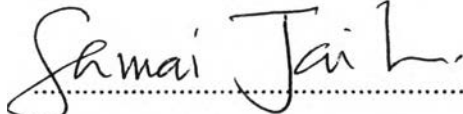
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University, in partial fulfilment of the requirements for the Degree of Master of  
Science.

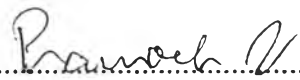
  
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## ABSTRACT

5271006063: Petrochemical Technology Program

Chesta Jindavat: Biodiesel Production from Palm Oil Using  
KOH/bentonite Catalyst

Thesis Advisors: Asst. Prof. Apanee Luengnaruemitchai and Captain  
Dr. Samai Jai-In 62 pp.

Keywords: Transesterification/ Biodiesel/ KOH/ Bentonite

The transesterification was carried out using KOH loaded on bentonite as a heterogeneous catalyst. The effects of reaction parameters, such as reaction time, % K loading, reaction temperature, molar ratio of methanol to oil, and amount of catalyst, were optimized for the production of biodiesel. The 25 wt% K/bentonite catalysts gave a biodiesel yield of 94.13% at 60°C within 3 h at a 1:15 molar ratio of palm oil to methanol and a catalyst amount of 3 wt%. The results showed that the catalyst having highest basicity exhibited the highest biodiesel yield. The catalyst was characterized by using XRD, FTIR, SEM-EDS, TPD, BET, and Hammett indicator. In addition, the effect of calcination temperature of the catalyst on the biodiesel yield was also studied.

## บทคัดย่อ

เชษฐา จินดาวัฒน์ : การผลิตไบโอดีเซลจากน้ำมันปาล์มโดยใช้โพแทสเซียมไฮดรอกไซด์บนเบนโทไนด์เป็นตัวเร่งปฏิกิริยา (Biodiesel Production from Palm Oil Using KOH/bentonite Catalyst) อ. ที่ปรึกษา : ผศ. ดร. อาภาณี เหลืองนฤมิตชัย และ นาวาเอก ดร. สมัย ใจอินทร์ 62 หน้า

ในงานวิจัยนี้ศึกษาปฏิกิริยาทรานส์เอสเตอริฟิเคชัน โดยใช้โพแทสเซียมไฮดรอกไซด์บนเบนโทไนด์ (KOH/bentonite) เป็นตัวเร่งปฏิกิริยาวิวิธพันธ์ ปัจจัยที่มีผลต่อปฏิกิริยา เช่น เวลาที่ใช้ในการเกิดปฏิกิริยา ปริมาณโพแทสเซียมบนเบนโทไนด์ อุณหภูมิที่ใช้ในการเกิดปฏิกิริยา อัตราส่วนโดยโมลระหว่างน้ำมันกับเมทานอล และปริมาณตัวเร่งปฏิกิริยาที่เหมาะสมในการเกิดไบโอดีเซล จากผลการทดลองพบว่า ปริมาณโพแทสเซียมร้อยละ 25 โดยน้ำหนักบนเบนโทไนด์ ให้ไบโอดีเซลร้อยละ 94.13 โดยน้ำหนัก ที่ อุณหภูมิในการเกิดปฏิกิริยาที่ 60 องศาเซลเซียส เป็นเวลา 3 ชั่วโมง อัตราส่วนโดยโมลระหว่างน้ำมันกับเมทานอลเป็น 15:1 และปริมาณตัวเร่งปฏิกิริยาร้อยละ 3 โดยน้ำหนัก (เทียบกับน้ำหนักของน้ำมันพืช) จากผลการทดลองยังแสดงให้เห็นว่า ตัวเร่งปฏิกิริยาที่ได้ มีความเป็นเบสสูงมากส่งผลให้ผลิตปริมาณไบโอดีเซลได้มากที่สุด นอกจากนี้มีใช้ XRD, FTIR, SEM-EDS, TPD, BET, และ Hammett indicator ในการวิเคราะห์คุณสมบัติของตัวเร่งปฏิกิริยา และมีการศึกษาอุณหภูมิที่เหมาะสมในการเผาตัวเร่งปฏิกิริยาที่มีผลต่อปริมาณไบโอดีเซล

## ACKNOWLEDGEMENTS

This thesis could not have been achieved without Asst. Prof. Apanee Luengnaruemitchai who not only served as my advisor but also encouraged and challenged me throughout this research work. I also would like to thank my co-advisor, Captain Dr. Samai Jai-In, and the thesis committee, Dr. Sarawut Kaewtathip and Assoc. Prof. Pramoch Rangsunvigit. Their dedication and support is very much appreciated.

I would like to thank my senior, Pisitpong Intarapong, for his assistance and support. I also would like to give an appreciation to all staffs of the Research Affairs for the training of analytical instruments.

I would like to take this opportunity to thanks the Petroleum and Petrochemical College, Chulalongkorn University for the knowledge and the providing support during my study. Also, I would like to extend my thanks to all PPC friends for their friendly cheerfulness and encouragement.

Sincere appreciations go to my family for their support, love, and understanding all the time.

This thesis work is funded by the National Metal and Materials Technology Center, Thailand; the Petroleum and Petrochemical College; and the National Center of Excellence for Petroleum, Petrochemicals, and Advanced Materials, Thailand.

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