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CATALYTIC HYDROCRACKING OF USED POLYSTYRENE

Miss Darin Khomentrakarn

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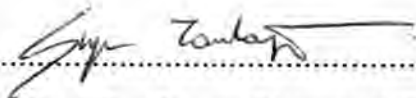
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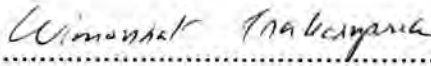
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คาริน โกเมนตระการ : คATALYTIC ไฮโดรแครกกิงของพอลิสไตรีนที่ใช้แล้ว (CATALYTIC HYDROCRACKING OF USED POLYSTYRENE) อ.ที่ปรึกษา : รศ. ดร. โสภณ เรืองสำราญ ; 138 หน้า, ISBN 974-638-526-7

งานวิจัยนี้ได้ทำการศึกษากการแตกตัวไฮโดรเจนของพอลิสไตรีนที่ใช้แล้วด้วยตัวเร่งปฏิกิริยาประเภท 2 หน้าที่ได้แก่ นิกเกิล-ดีบุก-ฟลูออไรด์บนโมเลคิวลาร์ซีฟ โทบอลด์-ดีบุก-ฟลูออไรด์บนโมเลคิวลาร์ซีฟ เหล็ก-ดีบุก-ฟลูออไรด์บนโมเลคิวลาร์ซีฟ และเหล็ก-ดีบุก-ฟลูออไรด์บนอะลูมินา ซึ่งการศึกษากกระทำโดยการแปรค่าอุณหภูมิในช่วง 325-350 องศาเซลเซียส ปริมาณตัวเร่งปฏิกิริยาในช่วง 5-40 เปอร์เซ็นต์โดยน้ำหนัก และภายใต้ความดันของแก๊สไฮโดรเจนในช่วง 300-500 ปอนด์ต่อลูกบาศก์นิ้ว ในเวลา 1-3 ชั่วโมง หรือภายใต้ความดันของแก๊สไนโตรเจนในช่วง 50-150 ปอนด์ต่อลูกบาศก์นิ้ว ในเวลา 5-6 ชั่วโมง

ตัวเร่งปฏิกิริยาและภาวะที่เหมาะสมในการแตกตัวไฮโดรเจนของพอลิสไตรีนที่ใช้แล้ว คือตัวเร่งปฏิกิริยาที่ประกอบด้วย เหล็ก 5 เปอร์เซ็นต์, ดีบุก 5 เปอร์เซ็นต์, ฟลูออไรด์ 2 เปอร์เซ็นต์บนโมเลคิวลาร์ซีฟ โดยใช้อุณหภูมิ 350 องศาเซลเซียส ปริมาณตัวเร่งปฏิกิริยา 15 เปอร์เซ็นต์โดยน้ำหนัก และความดันของแก๊สไฮโดรเจน 400 ปอนด์ต่อลูกบาศก์นิ้วในเวลา 1.5 ชั่วโมง สำหรับภาวะที่เหมาะสมในการแตกตัวของพอลิสไตรีนที่ใช้แล้วภายใต้แก๊สไนโตรเจนคืออุณหภูมิ 350 องศาเซลเซียส ปริมาณตัวเร่งปฏิกิริยา 10 เปอร์เซ็นต์โดยน้ำหนัก และความดันของแก๊สไนโตรเจน 100 ปอนด์ต่อลูกบาศก์นิ้วในเวลา 6 ชั่วโมง ผลที่ได้ของทั้งสองภาวะคือสารประกอบไฮโดรคาร์บอน ซึ่งมีเอธิลเบนซินเป็นผลิตภัณฑ์หลัก และรองลงมาคือโทลูอินและ ไอโซโพรพิลเบนซิน

ภาควิชา.....
สาขาวิชา..... ปิโตรเคมีและวิทยาศาสตร์พอลิเมอร์.....
ปีการศึกษา..... 2540.....

ลายมือชื่อนิติต.....
ลายมือชื่ออาจารย์ที่ปรึกษา.....
ลายมือชื่ออาจารย์ที่ปรึกษาร่วม.....

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Hydrocracking reactions of used polystyrene were performed with varying dual function catalysts (Ni/Sn/F on molecular sieve, Co/Sn/F on molecular sieve, Fe/Sn/F on molecular sieve and Fe/Sn/F on alumina catalysts). The variations were in the temperature, 325-350°C, catalyst concentration, 5-40% wt, hydrogen pressure, 350-500 psig for 1-3 hours and nitrogen pressure, 50-150 psig for 5-6 hours.

The optimum catalyst type was Fe(5%)/Sn(5%)/F(2%) on molecular sieve that was a new catalyst type. The optimum conditions for hydrocracking of used polystyrene were an operating temperature of 350°C, 15% wt of catalyst and 400 psig hydrogen pressure for 1.5 hours. The optimum conditions for cracking of used polystyrene were a temperature of 350°C, 10% wt of catalyst and under 100 psig nitrogen pressure for 6 hours. The products from both conditions were liquid hydrocarbons that ethylbenzene was the main component and toluene and isopropylbenzene were the second and third components.

ภาควิชา..... ลายมือชื่อนิสิต.....
สาขาวิชา ปิโตร เคมีและวิทยาศาสตร์พอลิเมอร์..... ลายมือชื่ออาจารย์ที่ปรึกษา.....
ปีการศึกษา 2540..... ลายมือชื่ออาจารย์ที่ปรึกษาร่วม.....

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ABBREVIATIONS

PS	=	Polystyrene
psig	=	pound per square inches gauge
GC	=	Gas Chromatography