EFFECT OF EXTERNAL SILANE DONORS ON ZIEGLER-NATTA CATALYST FOR POLYMERIZATION OF PROPYLENE

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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,
and Case Western Reserve University
2000

ISBN 974-334-141-2

I19356933

Thesis Title	:	Effect of Extenal Silane Donors on Ziegler-Natta Catalyst for Polymerization of Propylene
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ABSTRACT

4171021063: PETROCHEMICAL TECHNOLOGY PROGRAM
KEYWORD: Polypropylene/External Donor/Polymerization/Ziegler-Natta/ Isotactic Index
Nipat Lumlertluksanachai: Effect of External Silane Donors on Ziegler-Natta Catalyst for Polymerization of Propylene. Thesis Advisors: Prof. Somchai Osuwan, Dr. Rathanawan Magaraphan, and Dr. Suracha Udomsak, 72 pp ISBN 974-334-141-2

The effect of external silane donors of propylene polymerization, with a $MgCl_2$-supported $TiCl_4$ catalyst activated by $Al(C_2H_5)_3$, has been investigated. Five types of alkoxy silanes were used as external donors. The degree of isotactic index and activity depended on the types of alkoxy silane and amount of external donor used. Iso and cyclic structures of external donors enhanced the isotactic index. Addition of small amounts of external donors led to a significant increase in activity and isotactic index. At constant external donor content, an increase of Al/Ti resulted in an increase in activity and a decrease in isotactic index. Moreover, the activity of the polymer increased while the isotactic index decreased with increasing hydrogen concentration. The number average molecular weight ($\overline{M}_n$) of the polypropylene decreased as a result of hydrogen addition for the polymerization in the absence and presence of all electron donors.

บทคัดย่อ

นิพัทธ์ ล้ำเลิศลักษณชัย : ศึกษาผลของเอ็กทานอลไซเลนโดเนอร์ต่อตัวเร่งปฏิกิริยาซิกเลอร์แนตต้าของโพลีโพรไพลีน (Effect of Extenal Silane Donors on Ziegler-Natta Catalyst for Polymerization of Propylene) อ.ที่ปรึกษา : ศ. สมชาย โอสุวรรณ ดร. รัตนวรรณ มกรพันธุ์ และ ดร. สุรชา อุดมศักดิ์ 72 หน้า, ISBN 974-334-141-2

การวิจัยนี้ได้ศึกษาผลของเอ็กทานอลไซเลนโดเนอร์ (External silane donors) ของการทำโพลิเมอไรซ์โพรไพลีนที่ใช้ตัวเร่งปฏิกิริยาไททาเนียมเตตระคลอไรด์บนแมกนีเซียมคลอไรด์ซับพอร์ทซึ่งถูกทำให้ว่องไวโดยไตรเอททิลอลูมินัม โดยใช้อัลคอกซี่ไซเลน 5 ชนิดเป็นเอ็กทานอลโดเนอร์ ผลที่มีต่อความว่องไวของปฏิกริยาและดัชนีไอโซแทคทิค (isotactic index) จะมากหรือน้อยขึ้นอยู่กับชนิดของอัลคอกซี่ไซเลนและปริมาณเอ็กทานอลโดเนอร์ที่ใช้เติมลงไป โครงสร้างไอโซและไซคลิกของเอ็กทานอลโดเนอร์ช่วยส่งเสริมค่าดัชนีไอโซแทคทิค การเติมสารเอ็กทานอลโดเนอร์เพียงเล็กน้อยจะทำให้ความว่องไวของปฏิกริยาและค่าดัชนีไอโซแทคทิคเพิ่มขึ้น อัตราส่วนของอลูมินัมต่อไทเทเนียมเพิ่มขึ้นที่ความเข้มข้นของเอ็กทานอลโดเนอร์คงที่จะทำให้ความว่องไวของปฏิกริยาเพิ่มขึ้นและดัชนีไอโซแทคทิคลดลง ยิ่งไปกว่านั้นด้วยการเพิ่มความเข้มข้นไฮโดรเจนทำให้ความว่องไวของปฏิกริยาเพิ่มขึ้นขณะที่ดัชนีไอโซแทคทิคลดลง การเติมไฮโดรเจนจะทำให้น้ำหนักโมเลกุลเฉลี่ยโดยจำนวน ($\overline{M}_n$) ลดลงอีกด้วยทั้งที่มีการเติมเอ็กทานอลโดเนอร์และไม่มีการเติมเอ็กทานอลโดเนอร์

ACKNOWLEDGMENTS

I would like to express my extreme thank to my advisor, Professor Somchai Osuwan of the Petroleum and Petrochemical College, Chulalongkorn University for his advice and accept this thesis under his supervision.

My appreciation is also expressed to my co-advisor, Dr. Rathanawan Magaraphan of the Petroleum and Petrochemical College, Chulalongkorn University for her kind assistance, discussion and suggestion.

I would like to thank Cementhai Chemical Co.,Ltd. for the granted scholarship involving financially support, all of raw materials, apparatus and so on. I appreciate Dr. Suracha Udomsak, at Thai Polyethylene Co.,Ltd., for his help and discussions about Ziegler-Natta catalysts.

To my gorgeous wife, Niramon, I can't thank you enough for encouraging, understanding me in my success while you had been impregnated and giving us our son, Pongpakin. Finally, my special thanks are extended to my friends for their support.

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