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ลิขสิทธิ์ของจุฬาลงกรณ์มหาวิทยาลัย

**PREPARATION OF ZIEGLER-NATTA CATALYST FOR PRODUCING
HIGH DENSITY POLYETHYLENE WITH BROAD MOLECULAR WEIGHT
DISTRIBUTION**



Mr. Sakont Tunsurat

**A Thesis Submitted in Partial Fulfillment of the Requirements
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SAKONT TUNSURAT: PREPARATION OF ZIEGLER-NATTA CATALYST FOR PRODUCING HIGH DENSITY POLYETHYLENE WITH BROAD MOLECULARWEIGHT DISTRIBUTION. THESIS ADVISOR: ASSOC. PROF. SUPAWAN TUNTAYANON, Ph.D., 107 pp. ISBN 974-170-300-7

This study was divided into four parts. The first part involved the investigation on the optimum condition for preparing the catalyst support from the reaction of titanium tetrachloride and diethoxymagnesium in aliphatic hydrocarbons. The reaction temperature and stirring rate were varied. Fine catalyst support was resulted when the reaction was carried out at temperature 85 °C with stirring rate at 350 rpm. The addition of titanium tetrachloride dropwise in 5 hours gave better catalyst support than one portion addition as revealed by higher polymerization activity of its corresponding supported catalyst, obtained by reacting the catalyst support with triethylaluminium at the ratio of 1:0.5. The second part of this study was to prepare Z/N catalyst for producing low molecular weight HDPE. By variation of the amount of titanium tetrachloride, the catalyst supports with different titanium content were obtained. The melt flow index of HDPE catalyzed by each catalyst was determined. The highest melt flow index of HDPE was resulted when the ratio of titanium tetrachloride and diethoxymagnesium was 2.5. The third part was to prepare Z/N catalyst for producing high molecular weight HDPE. The preparation of this catalyst support was performed at the same condition for producing low molecular weight but it was washed 1-8 times with aliphatic hydrocarbon and then heated to 120 °C before the final washing. It was found that all catalyst supports contained more titanium content than the one without heating for all cases. Furthermore, the reaction of the catalyst support with triethylaluminium at 120 °C gave the Z/N catalyst for preparing of HDPE with the lowest melt flow index. The final part was to prepare Z/N catalyst for producing broad molecular weight HDPE by mixing both types Z/N catalyst at different ratios. It was found that the ratio of Z/N catalysts for producing low molecular weight HDPE and high molecular weight HDPE at 9:1 gave HDPE with highest molecular weight distribution.

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ABBREVIATIONS

Cp	:	Cyclopentadienyl
CpZ	:	Cyclopentadienyl zirconocene
GPC	:	Gel permeation chromatography
HDPE	:	High density polyethylene
MAO	:	Methylaluminoxane
MFI	:	Melt flow index
MFR	:	Melt flow index ratio
Mt-C bond	:	Metal carbon bond
Mw	:	Molecular weight by weight
MWD	:	Molecular weight distribution
ODCB	:	Othodichlorobenzene
rpm	:	Revolution per minute
TEA	:	Triethylaluminium
THF	:	Tetrahydrofuran
Tm	:	Melting temperature
Z/N	:	Ziegler-Natta

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