

**KEGGIN-TYPE POLYOXOMETALATE-PILLARED CLAY
BASED CATALYSTS FOR SELECTIVE CATALYTIC
REDUCTION OF NITRIC OXIDE BY AMMONIA**

Mr. Thakul Wongkerd

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By: Mr. Thakul Wongkerd
Program: Petroleum Technology
Thesis Advisors: Dr. Sirirat Jitkarnka
Dr. Apanee Luengnaruemitchai
Prof. Ralph T. Yang

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K. Bunyakit.

..... College Director
(Assoc. Prof. Kunchana Bunyakit)

Thesis Committee:

Sirirat Jitkarnka
.....
(Dr. Sirirat Jitkarnka)

Ralph T. Yang
.....
(Prof. Ralph T. Yang)

Apanee Luengnaruemitchai
.....
(Dr. Apanee Luengnaruemitchai)

Pomthong Malakul
.....
(Asst. Prof. Pomthong Malakul)

Pramoch Rangsunvigit
.....
(Asst. Prof. Pramoch Rangsunvigit)

ABSTRACT

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Deoxycholate and polyoxometalate ($PW_{12}O_{40}$ and $SiW_{12}O_{40}$) pillared-hydrotalcite-type clay catalysts were prepared and used for selective catalytic reduction of NO by NH_3 over excess oxygen in the reaction temperature range of 150 – 450°C. The results showed that over 99% N_2/N_2O selectivity was achieved at all testing temperatures for all pillared-clay catalysts. The activity of all pillared-clay catalysts increased significantly with temperature beyond 300°C. Effect of calcination temperature was also studied, and it was found that all pillared-clays had different thermal transition behaviors in the different stages of calcinations temperature, which affected to the SCR activity. The high activity was obtained over pillared-clays calcined at 500°C, and PW_{12} -clay catalyst had the highest activity. 5% Fe loading by impregnation method significantly increased activity of pillared-clay catalysts while N_2/N_2O selectivity was maintained the same. Fe-loaded catalysts also showed obviously higher N_2/N_2O selectivity over the commercial catalyst; 4.4% V_2O_5 – 8.2% WO_3/TiO_2 .

บทคัดย่อ

ฐาตุร วงษ์เกิด : การศึกษาปฏิกิริยารีดักชันอย่างเจาะจงของก๊าซไนตริกออกไซด์ด้วย ก๊าซแอมโมเนีย โดยอาศัยดินชนิดไฮโดรทาลไซต์ที่ถูกแทรกระหว่างชั้นด้วยกลุ่มโลหะชนิดโพลี ออกโซเมทัลเลทเป็นตัวเร่งปฏิกิริยา (Keggin-Type Polyoxometalate-Pillared Clay Based Catalysts for Selective Catalytic Reduction of Nitric Oxide by Ammonia) อ. ที่ปรึกษา: อ.ดร. ศิริรัตน์ จิตการคำ อ.ดร. อาภาณี เหลืองนฤมิตชัย และ ศ.ดร. ราฟ หยาง 61 หน้า ISBN 974-9651-19-7

ดินชนิดไฮโดรทาลไซต์ที่ถูกแทรกระหว่างชั้นด้วยอออนลบคือออกซีคลอเลท และ กลุ่ม โลหะโพลีออกโซเมทัลเลท ถูกนำมาใช้เป็นตัวเร่งปฏิกิริยาเพื่อศึกษาปฏิกิริยารีดักชันอย่างเจาะจง ของก๊าซไนตริกออกไซด์ด้วยก๊าซแอมโมเนียในช่วงอุณหภูมิ 150 ถึง 450 องศาเซลเซียส จาก การศึกษาพบว่า ค่าการลดลงของก๊าซไนตริกออกไซด์เพิ่มขึ้นเมื่ออุณหภูมิของปฏิกิริยาเพิ่มขึ้น ตั้งแต่ 300 องศาเซลเซียส โดยค่าการเลือกเฉพาะของการเกิดไนโตรเจนของตัวเร่งปฏิกิริยาทุกตัวมี ค่าสูงกว่าร้อยละ 99 ในทุกอุณหภูมิที่ใช้ทดลอง อุณหภูมิของการเผาตัวเร่งปฏิกิริยามีผลต่อ ความสามารถในการเร่งปฏิกิริยาด้วย จากการทดลองพบว่าตัวเร่งปฏิกิริยาที่เผาที่ 500 องศา เซลเซียส ให้ค่าการลดลงของก๊าซไนตริกออกไซด์สูงสุด การเติมเหล็กลงบนตัวเร่งปฏิกิริยา สามารถเพิ่มความสามารถในการลดก๊าซไนตริกออกไซด์ได้ โดยไม่ทำให้ค่าการเลือกเฉพาะของ การเกิดไนโตรเจนลดลง นอกจากนี้เมื่อเปรียบเทียบค่าการเลือกเฉพาะของการเกิดไนโตรเจน ของตัวเร่งปฏิกิริยาที่เตรียมขึ้นกับตัวเร่งปฏิกิริยาวานาเดียมออกไซด์ที่นิยมใช้อยู่ในปัจจุบัน ยังพบว่า ค่าการเลือกเฉพาะของการเกิดไนโตรเจนของตัวเร่งปฏิกิริยาที่เตรียมขึ้น มีค่าสูงกว่าด้วย

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TABLE OF CONTENTS

	PAGE	
Title Page	i	
Acceptance Page	ii	
Abstract (in English)	iii	
Abstract (in Thai)	iv	
Acknowledgements	v	
Table of Contents	vi	
List of Figures	ix	
CHAPTER		
I	INTRODUCTION	1
II	BACKGROUND AND LITERATURE SURVEY	3
2.1	Selective Catalytic Reduction (SCR) of NO _x by Ammonia	3
2.2	SCR Catalysts	4
2.3	Pillared Clay Catalysts for SCR of NO _x by NH ₃	5
2.4	Hydrotalcite-type Clay	6
2.5	Polyoxometalate-pillared Hydrotalcite-type Clay	7
III	EXPERIMENTAL	10
3.1	Materials	10
3.1.1	Catalyst Preparation Materials	10
3.1.2	Reactant Gases	10
3.2	Catalysts Preparation	11
3.2.1	Synthesis of Pillared-clay Catalysts	11
3.2.2	Synthesis of Fe-loaded Pillared-clay Catalysts	12
3.3	Catalyst Characterization	12
3.3.1	Thermal Gravimetric Analysis (TGA)	12

CHAPTER		PAGE
	3.3.2 X-ray Diffraction (XRD)	13
	3.3.3 Scanning Electron Microscopy (SEM)	13
	3.3.4 BET Surface Area	13
	3.4 Apparatus	14
	3.4.1 Gas Blending System	14
	3.4.2 Catalytic Reactor	14
	3.4.3 Analytical Instruments	14
	3.5 Catalytic Activity Testing	15
IV	RESULTS AND DISCUSSION	16
	4.1 Characteristics of Pillared-clay Catalysts upon Temperature Changes	16
	4.1.1 Transition Weight Loss of Pillared-clays	16
	4.1.2 Phase Transitions of Pillared-clays	19
	4.1.3 Structure Models of Pillared-clays	25
	4.1.4 Surface Morphology of Pillared-clays	28
	4.1.5 BET Surface Area, Total Volume, and Average Pore Diameter	32
	4.2 SCR Catalytic Activity of Pillared-clay Catalysts	34
	4.2.1 Effect of Phase Changes	34
	4.2.2 Promoting Effect of Fe	41
	4.2.3 Comparison between Clay-based Catalysts and the Commercial Catalyst	44
V	CONCLUSIONS AND RECOMMENDATIONS	46
	REFERENCES	47

	PAGE
APPENDICES	50
Appendix A Calculation of NO conversion and N ₂ /N ₂ O selectivity	50
Appendix B Raw data	52
CURRICULUM VITAE	63

LIST OF FIGURES

FIGURE		PAGE
2.1	Schematic drawing for the structure of hydrotalcite clays	7
2.2	Schematic drawing for the microstructure of deoxycholate-intercalation compound	9
2.3	The Keggin structure of the $\text{XM}_{12}\text{O}_{40}^{x-8}$ anion (α -isomer): terminal (O^1), edge-bridging (O^2), and corner-bridging (O^3) oxygen atoms	9
3.1	Schematic representation of SCR of NO with NH_3 process flow diagram	15
4.1	TGA and DTG of DA-clay.	17
4.2	TGA and DTG of PW_{12} -clay.	18
4.3	TGA and DTG of SiW_{12} -clay.	18
4.4	XRD patterns of (a) DA-clay dried at 110°C , and calcined at 200, 300, 350, 400, and 500°C , and (b) DA-clay calcined at 900°C : (m) $\text{Mg}(\text{OH})_2$ phase, (o) MgO phase, and (s) spinel phase	20
4.5	XRD patterns of (a) PW_{12} -clay dried at 110°C , and calcined at 250, 350, and 500°C , and (b) PW_{12} -clay calcined at 900°C : (m) $\text{Mg}(\text{OH})_2$ phase, (o) MgO phase, and (s) spinel phase.	22
4.6	XRD patterns of (a) SiW_{12} -clay dried at 110°C , and calcined at 250, 350, and 500°C , and (b) SiW_{12} -clay calcined at 900°C : (m) $\text{Mg}(\text{OH})_2$ phase, (o) MgO phase, (s) spinel phase, and (w) MgWO_4 phase	24
4.7	Structure models of DA-clay at different temperatures: (a) dried, (b) calcined at 250°C , (c) calcined at 350°C , (d) calcined at 500°C , and (e) calcined at 900°C	26

FIGURE		PAGE
4.8	Structure models of keggin-clay (PW_{12} -clay or SiW_{12} -clay) at different temperatures: (a) dried, (b) calcined at 250°C, (c) calcined at 350°C, (d) calcined at 500°C, and (e) calcined at 900°C	27
4.9	Scanning electron micrographs at 7500X magnification of (a) DA-clay dried, (b) DA-clay calcined at 350°C, (c) DA-clay calcined at 500 °C, and (d) DA-clay calcined at 900 °C	29
4.10	Scanning electron micrographs at 7500X magnification of (a) PW_{12} -clay dried, (b) PW_{12} -clay calcined at 350°C, (c) PW_{12} -clay calcined at 500°C, and (d) PW_{12} -clay calcined at 900°C	30
4.11	Scanning electron micrographs at 7500X magnification of (a) SiW_{12} -clay dried, (b) SiW_{12} -clay calcined at 350°C, (c) SiW_{12} -clay calcined at 500°C, and (d) SiW_{12} -clay calcined at 900°C	31
4.12	BET characterization of all catalysts: (a) BET surface area, (b) pore volume, and (c) average pore diameter	33
4.13	SCR activity results of pillared-clay catalysts calcined at 250°C: (a) NO conversion and (b) N_2/N_2O selectivity, at different reaction temperatures	35
4.14	SCR activity of pillared-clay catalysts calcined at 350°C: (a) NO conversion and (b) N_2/N_2O selectivity, at different reaction temperatures	36
4.15	SCR activity of pillared-clay calcined at 500°C: (a) NO conversion and (b) N_2/N_2O selectivity, at different reaction temperatures	37
4.16	SCR activity of pillared-clay catalysts calcined at 900°C: (a) NO conversion and (b) N_2/N_2O selectivity, at different reaction temperatures	39
4.17	Comparison between unloaded and Fe-loaded pillared-clay catalysts: (a) DA-clay, (b) PW_{12} -clay, and (c) SiW_{12} -clay	42

FIGURE		PAGE
4.18	N ₂ /N ₂ O selectivity of all Fe-loaded pillared-clay catalysts at different reaction temperatures	43
4.19	Proposed mechanism of the SCR reaction on Fe-Cr/TiO ₂	43
4.20	Catalytic activity comparison between the commercial catalyst and Fe-pillared-clay catalysts: (a) NO conversion and (b) N ₂ /N ₂ O selectivity	45