

**SILVER OXIDE (AgO) deNO_x CATALYST IN THE STATIONARY FLUE GAS:
FTIR AND TPR CHARACTERIZATION**

CHE WAN RIDUAN ASMADI B. CHE WAN EMBONG

**FACULTY OF CHEMICAL ENGINEERING
UNIVERSITI TEKNOLOGI MARA
SHAH ALAM**

2009

DECLARATION

“I hereby declare that this report is the result of my own work except for quotations and summaries which have been duly acknowledged.”



CHE WAN RIDUAN ASMADI B. CHE WAN EMBONG

NOVEMBER 2009

2006844058

ACKNOWLEDGEMENT

In the name of Allah, the most gracious and the most merciful. First and foremost, I would like to express my sincere gratitude to Allah for giving me the opportunity to complete the research.

I would like to take this opportunity to express my sincere thanks and appreciation to the following person and individuals that have directly or indirectly given generous contributions towards the success of this thesis project. First and foremost, I would like to thank my thesis supervisor, Pn. Kamariah Noor Ismail for his consistent guidance and advice throughout the preparation of this thesis. This thesis would not be able to be completed in time without her constant encouragement and guidance. Not forgetting the technical staffs, En. Jamil, Nazmi, Pn. Diana, Mustafa, Afzal and Kak Hidayah.

I would like to thank all my friends and course mates that help me a lot and gave valuable advices and tips when encountered problems during the preparation of this project.

Besides, the support and tolerance by each of my family members are much appreciated. Without their constant and encouragement and support, I would not have the total concentration on doing a good job.

Lastly, I also like to express my gratitude and thanks to University Teknologi Mara Malaysia (UITM) for having such a complete and resourceful library such as Perpustakaan Tun Abdul Razak. Without it, I would not be able to complete my project in time as much of my literature study and analysis are based on the sources and information gathered from the library.

ABSTRACT

The purposes of this study are to prepare the deNO_x catalyst (AgO/Al₂O₃-SiO₂) and to characterize the deNO_x catalyst using temperature programmed reduction (TPR) and fourier transform infrared spectroscopy (FTIR). The optimum reduction temperature and the functional group of deNO_x catalyst is identified. Besides that, the applying of low cost catalyst for this study which is silver oxide (AgO) can replace the present catalyst metal such as Platinum Group Metal (PGM) which is very expensive. The problem of NO_x emission from the stationary sources such as transportation, fuel combustion and industrial process is the main focus to develop the deNO_x catalyst. The methodology used to prepare catalyst includes ball-milled and pre- calcinations process and mechanical mixing catalyst. For calcinations process, five calcinations temperature involved which is 400°C, 500°C, 600°C, 700°C and 800°C respectively. Result for the TPR characterization show that the maximum reduction temperature occurs in the temperature range of 270-690° where the most gas hydrogen was absorbed. The total amounts of gas absorbed during this temperature range are 308.63 μmol/g. While for the FTIR the functional group that appear in the prepared deNO_x catalyst appear is Si-O bond because the ratio of wt% of the silica is higher than AgO and alumina.

TABLE OF CONTENTS

	Page
DECLARATION	i
CERTIFICATION	ii
ACKNOWLEDGEMENT	iv
ABSTRACT	v
TABLE OF CONTENTS	vi
LIST OF TABLES	ix
LIST OF FIGURES	x
LIST OF PLATES	xi
LIST OF ABBREVIATIONS	xii
CHAPTER 1 INTRODUCTION	
1.1 Research Background – Relevance to Malaysia	1
1.2 Problem of Statement	2
1.3 Objective of Research	4
1.4 Research Scope and Limitations	4
1.5 Significant of Research	5
1.6 Thesis Outline	5