



IST871

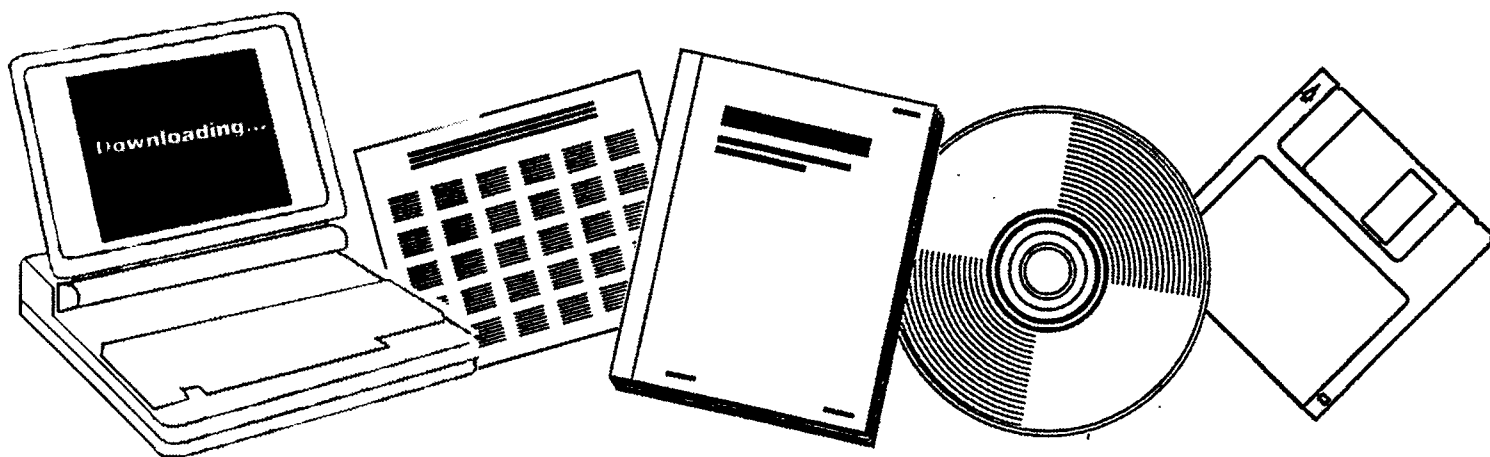
NTIS

One Source. One Search. One Solution.

METHANATION REACTION ON RUTHENIUM THIN FILMS: A MECHANISTIC INVESTIGATION

AMES LAB., IA

JUL 1979



U.S. Department of Commerce
National Technical Information Service

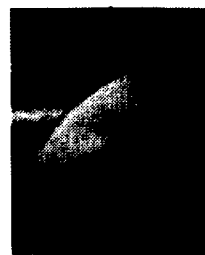
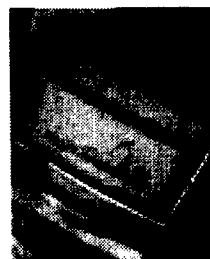
One Source. One Search. One Solution.

NTIS



**Providing Permanent, Easy Access
to U.S. Government Information**

National Technical Information Service is the nation's largest repository and disseminator of government-initiated scientific, technical, engineering, and related business information. The NTIS collection includes almost 3,000,000 information products in a variety of formats: electronic download, online access, CD-ROM, magnetic tape, diskette, multimedia, microfiche and paper.



Search the NTIS Database from 1990 forward

NTIS has upgraded its bibliographic database system and has made all entries since 1990 searchable on **www.ntis.gov**. You now have access to information on more than 600,000 government research information products from this web site.

Link to Full Text Documents at Government Web Sites

Because many Government agencies have their most recent reports available on their own web site, we have added links directly to these reports. When available, you will see a link on the right side of the bibliographic screen.

Download Publications (1997 - Present)

NTIS can now provides the full text of reports as downloadable PDF files. This means that when an agency stops maintaining a report on the web, NTIS will offer a downloadable version. There is a nominal fee for each download for most publications.

For more information visit our website:

www.ntis.gov



U.S. DEPARTMENT OF COMMERCE
Technology Administration
National Technical Information Service
Springfield, VA 22161



The methanation reaction on ruthenium thin films:

A mechanistic investigation

by

Michael Dwayne Slaughter

A Dissertation Submitted to the
Graduate Faculty in Partial Fulfillment of
The Requirements for the Degree of
DOCTOR OF PHILOSOPHY

Department: Chemistry
Major: Physical Chemistry

Approved:

In Charge of Major Work

For the Major Department

For the Graduate College

Iowa State University
Ames, Iowa
1979

TABLE OF CONTENTS

	Page
ABSTRACT	v
INTRODUCTION	1
EXPERIMENTAL	32
Vacuum System Design	32
Thin Film Deposition Techniques	38
Kinetics Procedure	42
Surface Pretreatment Studies	46
Flash Desorption Studies	47
Surface Characterization Studies	49
Materials	52
RESULTS AND DISCUSSION	54
Thin Film Characterization	54
Surface Characterization Studies	61
ESCA Characterization of Ruthenium-Adsorbate Interaction	89
Reaction Kinetics	92
Exchange Studies	108
Flash Desorption Study	112
Mechanistic Considerations	114
SUGGESTIONS FOR FUTURE RESEARCH	167
APPENDIX I	168
APPENDIX II	171
LITERATURE CITED	173
ACKNOWLEDGEMENTS	181