

2. FY 2002 Results

2.1 Researcher Assigned

2.1.1 King Abdulaziz University

(1) Researchers

Dr. Mohammed Ismail Abdulsalam

Chairman, Chemical and Materials Engineering Department

Assistant Professor

(2) Organization providing training

National Institute for Materials Science (NIMS)

(Tadashi Shinohara, Director, Materials Lifetime Estimation Group, Materials Engineering Laboratory)

(3) Research topic

Analysis of liquid mass transfer in a crevice based on measurement of the speed of metal dissolution using the moiré method

Research was carried out using a moiré method system for *in-situ* measurement of the dissolution behavior of crevice corrosion that is of the greatest importance when considering the local corrosion in materials used in the manufacture of oil refinery production equipment. This research was performed to study the relationships of environmental factors such as temperature, ion concentration, and electrode potential, and the material factors such as alloying elements. Furthermore, by combining the results of these actual measurements with a mathematical model created using the finite element method, estimation of crevice dissolution and PH were performed, as well as an analysis of how the various factors affect the behavior from the outset of corrosion to its fully developed state.

(4) Schedule: August 15 - October 7, 2002

2.1.2 King Abdulaziz City for Science and Technology

(1) Researcher

Mr. Saud Abdulaziz AL-Drees

Researcher in KACST

(2) Organization providing training

Kyoto University Graduate School of Engineering

(Professor Koichi Eguchi, Department of Energy and Hydrocarbon Chemistry)

(3) Research topic

Study of the production of synthesis gas created by partial oxidation of methane by using hexaaluminate catalysts containing nickel

The catalyst used for the methane partial oxidation was made from hexaaluminate containing nickel ($\text{BaNi}_\gamma\text{Al}_{12-\gamma}\text{O}_{19-\alpha}$) that was hydrolyzed and sintered at high temperature. The crystal structure and catalytic properties of this catalyst were examined using X-ray analysis and a thermal analyzer. As a result, it was found that when the nickel content was reduced, there was outstanding catalytic activity and stability in regard to the partial oxidation of methane and synthesis gas production.

(4) Schedule: August 20 - November 10, 2002

2.1.3 Kuwait Institute for Scientific Research

(1) Researcher Assigned

(a) Mr. Masoud Al-Marri

Research Associate of KISR,

(b) Mr. Ayedh Almutairi

Co-Supervisor and Task Leader in KISR

(2) Organization providing training

Central Research Laboratories, Idemitsu Kosan Co., Ltd.

(3) Research topic

Learning to operate a pilot plant for the crude oil direct quality improvement process and training in thermal analysis

Currently, the KISR laboratory is researching quality improvement without crude oil cracking; however, in order to accomplish this research, as well as to study such essential elements as reaction speed analysis, catalyst life-span simulation, and pilot plant operation analysis factors, actual plant operation was used to acquire those skills.

(4) Schedule: May 24 - June 23, 2002

2.1.4 King Fahd University of Petroleum and Minerals

(Part 1)

(1) Researcher

Dr. Mohammad Ashraf Ali

KFUPM RI Research Scientist III

(2) Organization providing training

Faculty of Environmental Engineering, University of Kitakyushu

(Professor Sachio Asaoka, Department of Chemical and Environmental Engineering)

(3) Research topic

Modification of hydrogenolysis catalysts for heavy oil

Research was performed relating to modification of catalysts used for hydrogenolysis of vacuum light oil or normal pressure residual oil.

The modification method used was alumina-titania and catalyst mold binder (Cataloid AP-1) with the addition of USY zeolite mixed with deionized water and 1/16-inch extruded shapes were formed. These were then air-dried for two hours at 120°C and then broken into 3 mm to 4 mm lengths to a long side and calcined at 550°C for two hours. Ni-Mo was then loaded and after drying overnight at room temperature, air-dried for another two hours at 120°C and finally sintered for two hours at 550° to form the catalyst used. For this study, the catalyst was modified at a variety of mixing ratios.

(4) Schedule: June 12 - July 9, 2002

2.1.5 King Fahd University of Petroleum and Minerals

(Part 2)

(1) Researcher

Dr. Syed Ahmed Ali

KFUPM RI Research Engineer III

(2) Organization providing training

Advanced Catalyst Research Laboratory, Japan Cooperation Center, Petroleum

(3) Research topic

Speech and exchange of ideas relating to hydrogenation catalysts at TOCAT 4.

At The 4th Tokyo Conference on Advanced Catalytic Science and Technology (TOCAT4), Dr. Syed took part as the announcer of the paper entitled, "Preparation, Characterization, and Catalytic Evaluation of First Stage Hydrocracking Catalysts," as a joint collaboration between the JCCP Advanced Catalyst Research Laboratory and KFUPM. The paper was about a new method of determining the hydrogenation activity of a binary function hydrogenolysis catalyst. The catalyst was manufactured at KFUPM, and the JCCP Advanced Catalyst Research Laboratory performed the catalyst evaluation.

After the conference, a visit was made to the JCCP Advanced Catalyst Research Laboratory, and the Nippon Oil Corporation Laboratory. Ideas and opinions were exchanged and discussed regarding the state of catalyst research at KFUPM, and the issues arising during pilot operation.

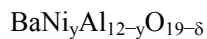
(4) Schedule: June 12 - June 28, 2002

3. Data - Research Report

3.1 Mass transfer analysis of solution chemistry inside crevice using metal dissolution rates measured with moire method

Dr. Mohammed Ismail Abdulsalam

3.2 The partial oxidation of methane to syngas over the nickel-containing hexaaluminate catalyst



Mr. Saud Abdulaziz Al-Dress

3.3 Study and training for pilot plant operation & kinetic analysis for crude oil direct upgrading process

Mr. Masoud Almarri, Mr. Ayedh Almutairi

3.4 Preparation of novel catalysts for heavy oil hydrocracking

Fourth International Tokyo Conference on Advanced Catalytic Science and Technology (TOCAT4)

Dr. Mohammad Ashraf Ali

3.5 Activity as visiting researcher during July 14 to 27, 2002

Fourth International Tokyo Conference on Advanced Catalytic Science and Technology (TOCAT4)

Dr. Syed Ahmed Ali