

## Preface

Hydroprocessing has been widely recognized to be one of the most important secondary processes in petroleum refining. It is mainly used to reduce the impurities content from almost all the fractions obtained by atmospheric or vacuum distillation of crude oils, e.g. straight-run naphtha, light and heavy gas oils, light and heavy vacuum gas oils, atmospheric and vacuum residua, but also from streams originating from secondary processes like fluid catalytic cracking units (FCCU), namely light cycle oil and naphtha. Due to the increasing production of heavy and extra-heavy crude oils and the declining production of light crude oils, together with the high demand for automotive fuels with reduced amounts of sulfur and nitrogen contaminants, hydroprocessing has experienced renewed interest from refiners, catalyst manufacturers and research centers. Moreover, the necessity for producing upgraded crude oils or synthetic crude oils (SCO) has led to hydroprocessing as the best technological option to produce light oils from heavy petroleum as well for export purposes as for satisfying the internal demand of refinery products in countries with high production of such heavy crude oils.

Considered as a mature technology, it seemed that nothing new could be developed in hydroprocessing, but on the contrary, the present needs in terms of fuel quality and processing of heavy oils require sustained research in several technological aspects ranging from very basic to applied research, for instance catalyst development (new supports, preparation methods, . . .), catalyst characterization, modeling of reaction kinetics (single event, structure oriented models), reactor modeling and simulation, reactor design (internals, multi-bed and multi-reactor configurations).

Given that hydroprocessing has been, is, and will continue to be one of the most applied and studied petroleum refining processes there is a need to keep those involved updated on the recent advances achieved by the different research groups working in this area. This has been the main goal of the International Symposium on Advances in Hydroprocessing of Oils Fractions (ISAHOF) held in the historical and beautiful City of Morelia in the State of Michoacan, Mexico, from 25 to 29 June 2007. This was the second time that ISAHOF was organized in Mexico. Indeed, ISAHOF 2004 was held in the City of Oaxaca, Oaxaca, Mexico in April 2004. Thirty-eight papers were published in a special issue of *Catalysis Today* (vol. 98, 2004).

ISAHOF 2007 started on Tuesday, 25 June, with a plenary lecture given by Professor Gilbert F. Froment (Texas A&M University, USA), in which several aspects of the realistic kinetic modeling of hydrodesulfurization were covered. Recent result using real feeds (gas oil and light cycle oil) were presented. The kinetic parameters were obtained using the structural contributions approach. The first conference day finished with a reception, in which local snacks, red and white wines were served. A couple of singers playing guitars livened up the reception with a great variety of local and international songs.

Professor Isao Mochida (Kyushu University, Japan) was the second day plenary lecturer. He described comprehensive approaches to heavy oil upgrading recognizing the need for further research in this area and presenting various choices in upgrading procedures to meet the current and future requirements. He proposed directions for research and development of the upgrading technologies most fitted to the various heavy crudes.

Two oral sessions followed this lecture: Session 1 “Heavy oil hydroprocessing catalysts” and Session 2 “Miscellaneous”. In the afternoon, Professor Murray R. Gray (University of Alberta, Canada) presented his plenary lecture on the chemical structure of vacuum residue components and their implications for hydrotreating and hydroconversion. He focused on the description of the molecular structure and on the properties of certain species that allows the application of powerful molecular simulation techniques to estimate thermophysical properties, reaction pathways, adsorption onto surfaces and aggregation in solution, with the main objective of improving the catalysts and processes for hydroprocessing. Oral Session 3 dealt with “Residual oil hydroprocessing”. The conference dinner was the last activity of the second day. A professional singer and guitar player accompanied volunteer singing stars among the conference participants. Mariachi music was the perfect concluding activity of that day.

The effect of supports like  $\text{TiO}_2$ ,  $\text{SiO}_2$  and  $\text{MgO}$  on the hydrotreating of model compounds over NiMo catalysts, the life cycle of hydroprocessing catalysts and the total catalyst management were the topics of the plenary lectures presented by Professor Jorge Ramirez (UNAM, Mexico) and Dr. Andrea Battiston (Albemarle Catalyst, The Netherlands). Professor Ramirez highlighted that adequate design of the characteristics

of the catalytic support is of great importance in the development of better hydrotreating catalysts and that by means of an adequate support design it is possible to increase significantly the HDS, HYD and HDN functionalities of hydrotreating catalysts. Dr. Battiston recognized that the use of advanced analytical techniques for monitoring the life cycle of commercial hydroprocessing catalysts is very important to understand the changes in catalyst properties taking place during its life cycle. Oral Session 4 “Catalyst preparation and characterization” and Oral Session 5 “Mesoporous materials” were held in the morning. The afternoon’s Poster Session comprising 40 papers was a perfect opportunity for intense discussions not only of the posters but also of the plenary lectures and oral papers presented until that day. This poster session was also the best place to foster collaborations between different institutions and countries.

On the last day Dr. Jan Verstraete (IFP-Lyon, France) and Professor Muthana Al-Dahhan (Washington University in St. Louis, USA) presented plenary lectures on recent insights gained from simulation at different scales in hydroprocessing, and on the advancement of trickle-bed reactors and their scale-up, respectively. Details about kinetic and reactor modeling as well as the importance of proper selection and application of scaling-up approaches were discussed. Oral Session 6 “HDS of model compounds”, Oral Session 7 “Kinetic and reactor modeling I”, and Oral Session 8 “Kinetic and reactor modeling II” concluded the final day.

A total of 110 people attended ISAHOF 2007. Participants came from the following countries: Argentina, Brazil, Canada, Colombia, China, France, India, Japan, Kuwait, Mexico, The

Netherlands Antilles, Norway, South Africa, The Netherlands, USA, UK, and Venezuela. Five exhibitors offered different products and services: ABB, Albemarle Catalyst, Separation Systems, Anton Paar, and CRC Group.

The present issue is a compilation of 31 selected full manuscripts which deal with different aspects of hydroprocessing. The guest editors would like to acknowledge all the contributors and referees who carefully reviewed the manuscripts. They are also indebted to Catalysis Today, in particular to Professor James G. Spivey, for his help and guidance during the preparation of this issue.

Jorge Ancheyta\*

*Instituto Mexicano del Petróleo, Eje Central Lázaro Cárdenas  
152, Col. San Bartolo Atepehuacan,  
México D.F. 07730, Mexico*

Gilbert F. Froment<sup>1</sup>

*Artie Mc Ferrin Department of Chemical Engineering,  
Texas A&M University, 3122 TAMU, College Station, TX  
77843-3122, United States*

\*Corresponding author. Tel.: +52 55 9175 8443;

fax: +52 55 9175 8429

<sup>1</sup>Tel.: +1 979 845 0406; fax: +1 979 845 6446.

*E-mail address: jancheyt@imp.mx (J. Ancheyta)*

*g.froment@che.tamu.edu (G.F. Froment)*

Available online 4 December 2007