

American Institute of Chemical Engineers

9th Topical Conference on Refinery Processing 2006

Held at the 2006 AIChE Spring National Meeting

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9th Topical Conference on Refinery Processing

Session 19 - Analysis/Characterization Tutorial

This session provides an introduction to hydrocarbon mixture analysis and characterization.

CoChair: Isabelle Henaut

Chair: James Speight

- 1 Interactions of Synthetic Additives with Petroleum Aggregates Probed by Small-Angle Neutron Scattering
Keith L. Gawrys, Paul M. Lindemuth
- 2 Near-Infrared Modeling of Conjugated Diolefins in Selective Hydrogenation Units
Clementina Lopez-Garcia, H el ene Biguerd, Nathalie Marchal-George, Fran ois Wahl
- 12 Measurements of the Association and Stability of Asphaltenes - a Multidisciplinary Approach
Simon Ivar Andersen

Session 20 - Bottom of the Barrel Processing

This session will include a Keynote speech for the first paper.

CoChair: Jinwen Chen

Chair: Syamal K. Poddar

- 13 Changes in Asphaltene Structure and Stability during Hydrotreating
Simon Ivar Andersen, Diep Duong, Jesper Bartholdy
- 14 Coke Quenching in the Delayed Coking Process
Keith Wisecarver, Michael Volk
- 15 Stability of Water-in-Crude Oil Emulsions in the Burgan Oilfield
Adel Elsharkawy, Harvey Yarranton, Taher Al Sahhaf, Mohamed Fahim

Session 21 - Desalting Tutorial

Desalter operation has a direct impact on crude column overhead corrosion control, metals content in conversion unit feed, and refinery waste water treatment. Heavier, higher metals and sulfur content crude oils are now frequently processed in many refineries. Finding ways to improve desalter performance has become a high priority in most refineries. At the same time, the processing of opportunity crude oils has made desalter operation more challenging. This session will concentrate on papers describing aspects of basic desalter operation. Papers are invited which cover best practices in current desalter vessel design.

equipment, and operating strategies.

CoChair: Andrew B. Woodside

Chair: Larry Kremer

- 16 Developing Crude Pre-Treating Programs to Improve Downstream Operations
Sandra N. Garcia-Swofford, Tony Potter
- 17 Solids Handling in Crude Oil
Alan Goliaszewski, David Engel, Cato McDaniel, Harold Eggert
- 18 Controlling Quality Variations in the Feed to Desalters
Larry Kremer

Session 55 - Advances in Desalting

New Developments in crude treatment

CoChair: Andrew B. Woodside

Chair: Larry Kremer

- 25 Parallel Comparison of Two Different Desalting Technologies—a Case Study
Shaya Movafaghian, Tom Collins, James Chen
- 37 Bimodal Modulation for Enhanced Desalting
Gary W. Sams, Kenneth W. Warren
- 44 New Control Technology for Desalter Optimisation
Paul Hewitt, **Scott Vidrine**
- 45 Desalter Interface Control and Diagnostics Utilizing Sonar Transducers
R. Paul Clewis
- 46 Removal of Calcium and Other Metal Species Form Crude Oil in the Desalting Process, Part 2
Larry Kremer, Joe Nguyen, Jerry Weers

Session 56 - Advances in FCC

This session discusses recent trends in FCC operations, catalysts, reliability and any other area of interest. Papers are desired from FCC Operators, FCC designers, FCC catalyst vendors and anyone doing active research on FCC improvements.

CoChair: Marty Poole

Chair: Lori T. McDowell

- 52 Heat of Cracking for Naphtha in Risers of Fcc Units
Carlos Alberto Dantas Moura, Andrea de Rezende Pinho, Jose Mozart Fusco
- 60 How Fccu Trickle Valves Affect Catalyst Losses
Donald F. Shaw, Richard E. Walter

- 73 Heat Transfer and Heat Removal in Flowing Dense Phase Fluidized Beds
Peter Van Opdorp, david lomas
- 74 Molecular Based Kinetic Modeling of Fcc Process
Ryuzo Tanaka, Craig A. Bennett, Michael T. Klein
- 84 Evaluation of the Pid Performance for Fcc Units
Pleycienne Ribeiro Trajano, M. R. Wolf Maciel, **R.ubens Maciel Filho**
- 93 Optimizing FCC: LPG rate and Cat Gasoline Octane Constraints
Marty Poole

Session 57 - Aromatics

The session on Aromatics will focus on new developments in production of aromatics (BTX) and aromatic derivatives, such as, but not limited to, ethylbenzene, cumene, linear alkylbenzene(LAB)styrene, phenol, bis-phenol, teraphthalic acid, and polyethyleneteraphthalate. Papers covering best practices in operation, safety, maintenance, controls and optimization are also invited.

Cochairs: B. Erik Henry
Robert J. Schmidt

Chair: Bipin V. Vora

- 94 Investigation into a Novel, Green Technology for Aromatic Thiol Production, a Density Functional Theory (Dft) Study
Bradley R. Atkinson, Rayford G. Anthony
- 99 Commercialization of a New Ultra High Purity/ High Yield Phenol Process from Sunoco-Uop
Robert J. Schmidt Jr.
- 118 Production of Metaxylene within the Aromatic Complex
Philibert Leflaive, Luc Wolff, Karin Barthelet
- 119 Integrating Petrochemical Industry with a Fuel Oriented Refinery
Ahmed S. Khogeer, Mohammed Ahmed Balamesh
- 128 Factors That Affect the Quality of the Essential Lemon Oil (Citrus Aurantifolia) during the Distillation
Gamarra, F.M.C., Sakanaka, L.S., Tambourgi, E. B. Cabral

Session 89 - Advances in Hydroprocessing I

Environmental regulations mandating the production of ultra low sulfur diesel (ULSD, < 10 wppm S) and ultra low sulfur gasoline (ULSG, < 30 wppm S and ultimately < 10 wppm S) have challenged the refining industry to develop and implement new catalyst and process technology. Papers covering advances in catalyst and process development in hydroprocessing technology designed to help the refiner meet these

challenging specifications are solicited for this symposium. Hydroprocessing applications in distillate hydrotreating, FCC feed pre-treating, desulfurization of FCC gasoline are welcome as well as novel technologies that address the production of clean fuels. Papers describing commercial experience in the application of new hydroprocessing catalysts and processes are also encouraged.

CoChair: Stuart Shih

Chair: Peter Kokoyef

- 136 Impact of Future Fuel and Crude Demand on Refinery Hydroprocessing
William Keesom
- 137 Limiting Factors in Deep Hydrodesulfurization of Diesel
Teh C. Ho
- 138 Effect of the Oxide Precursors on the Sulfurability of Hydrotreating Como(P) Catalysts
Anne D. Gandubert, Christelle Legens, Denis Guillaume, Christophe Pichon, Edmond Payen
- 149 Study about Formation Al₂O₃-TiO₂ Nanofibers as Supports for Hydroprocessing Catalysts
Jose Antonio Muñoz Lopez, Esteban Lopez Salinas, Jose Antonio Toledo Antonio, Carlos Angeles Chavez, Jose Escobar Aguilar
- 150 Unsupported Sulphide and Nitride Catalysts for Hydrotreating: New Preparation Approaches
Pavel Afanasiev
- 158 Catalyst Selection for Ultra Low Sulfur Diesel Operations: Activity and H₂ Consumption Considerations
Lawrence S. Kraus, Katsuhisa Fujita, Yuji Noguchi

Session 90 - Advances in light hydrocarbon processing

This session is for papers on catalytic reforming improvements in process flow, operations and catalysts.

CoChair: Russ Anderson

Chair: Ken Peters

- 178 Comparison of Existing and Emerging Alkylation Technology
Cal Hodge
- 179 The AlkyClean[®] Process - Demonstrated New Standard for Alkylation Technology
Vincent J. D'Amico, John C. Gieseman, Emiel H. Van Broekhoven
- 189 Platinum Level Effects in C₅/C₆ Isomerization
Richard Rosin, Mark Lapinski, James Vassilakis, Veronica Godfrey

- 198 Welded Plate Exchangers: More Than Ever Needed in Catalytic Reforming
Francois R. Reverdy
- 215 Alkylene™ - Improved Solid Catalyst Alkylation Technology for Clean Fuels
Douglas A. Nafis, Margaret A. Stine, Dale J. Shields, Gary A. Dziabis

Session 100 - Petrochemicals from Heavy Oils

Papers in this session will highlight the use of heavy feedstocks to make petrochemicals

CoChair: Stuart Shih

Chair: Michael C. Oballa

- 216 Transformation of Heavy Gas Oils Derived from Oil Sands to Petrochemical Feedstock
Duke du Plessis, Catherine Lareshen
- 226 Selective Ring Opening of Diesel Fuels
R.G. Egeberg, Simon Ivar Andersen, D.D. Whitehurst, G. Hytoft, K.G. Knudsen
- 228 Advanced Technology for Aromatics Saturation
Frank Mey, Rainer Schoedel, Reinhard Geyer, Dirk Lose, **Kristi Ann Morris**, Paul Himelfarb
- 229 Effect of Chlorine, Fluorine and Titania on Surface Structure and Hydroprocessing Activity of Ni-Mo Catalysts Supported on Alumina
Deena Ferdous, Narendra N. Bakhshi, Ajay K. Dalai, John Adjaye

Session 103 - Upgrading and Processing of Opportunity Crudes I

"Opportunity" crudes are generally characterized by a variety of properties undesirable to a refiner, such as high total acid number (TAN), high sulfur, nitrogen and aromatics content, high viscosity, etc. Although these crudes can cause corrosion and fouling problems in a downstream facility, they offer attractive discounts in crude prices. Effective methods and technologies to upgrade and process opportunity crudes can resolve these problems and provide attractive margins to the refiner. This session is geared towards exploring the current R&D and technology status on upgrading and processing of opportunity crudes. Papers are solicited on this topic in the areas of research studies to understand the fundamental science, current industrial strategies and technologies, and the development of new processes and technologies.

CoChair: Priya Rangarajan

Chair: Jinwen Chen

- 239 Producing Synthetic Crude Oil from Heavy Oils: Process Heat Integration
Jorge Ancheyta, Jose A.D. Munoz, Ignacio Elizalde
- 240 Residue Upgrading of Heavy Crudes with SydecSm Delayed Coking: Benefits and Economics
John D. Elliott
- 250 Effects of Trace Amount of Noble Metal (Pd/Rh) on the Performance of Co-Clay Catalysts for Heavy Oil Upgrading
Mohammad M. Hossain
- 260 Salt Hydrolysis in Crude & Bitumen Refining
Paul E. Eaton, Murray Gray, Tuyet Le
- 261 Light Cycle Oil Hydrotreating with Catalysts Containing W, Ni, Treated Zeolite, and Alumina
Lianhui Ding, **Zisheng Zhang**, Ying Zheng, Zbigniew Ring, Jinwen Chen
- 269 Understanding the Mechanism of Iron Sulfide Induced Fouling in Upgrading
C.B. Panchal
- 270 Smart, Integrated Approach to Capturing Acid Crude Value
Mike Hodges, Christopher Gould

Session 130 - Advances in Hydroprocessing II

2nd session of same subject

CoChair: Stuart Shih

Chair: Peter Kokayeff

- 271 Comparative Study of Vapor-Liquid Equilibrium during Hydroprocessing of Different Petroleum Feedstocks
Jinwen Chen, Wei Jiang, Hong Yang, Zbigniew Ring
- 281 Value Driven Catalyst Developments in Fcc Pretreatment Service
Vito Bavaro, **Pat Gripka**, Alexei Gabrielov, Changan Zhang, John Smegal
- 297 Low Emission Diesel Production through Upgrading Lco
Roberto E. Galiasso
- 308 Effect of Promoters on Structural and Chemical Properties of Hydrotreating Catalysts
R.G. Egeberg, K.G. Knudsen, A. Carlsson, M. Brorson, H. Topsøe, P.G. Moses, Jens K. Nørskov, J. Kibsgaard, J.V. Lauritsen, F. Besenbacher
- 312 Hydrocracking for Clean Fuels Production
Suheil F. Abdo, Vasant P. Thakar, Bart Dziabala
- 313 Thermochemistry of Coking in Hydroprocessing Units: Modeling Competitive Naphthalene Saturation and Condensation Reactions
Paul Robinson, Lawrence S. Kraus

Session 133 - Energy Conservation

Energy conservation is becoming increasingly important in the refining and petrochemical industries. Economic pressures and rising fuel costs encourage more efficient use of energy within these industries so that operating costs can be reduced. Regulatory pressures are also forcing these plants to become more energy efficient so that CO₂ emissions can be reduced. This session will address new developments related to energy conservation in refineries and petrochemical plants, which may include topics such as new equipment and processes, cogeneration, integration of refineries and power plants, and design techniques and methodologies that identify energy saving opportunities. Papers are encouraged from refiners, petrochemical producers, vendors, and academics, as well as anyone else with an interest in this area.

CoChair: Kirtan K. Trivedi

Chair: Michael A. Schultz

- 332 Energy Conservation and Innovation of Basic Chemical Processes: Drivers and Barriers
Tao Ren
- 343 Energy Savings for Refinery and Petrochemical Industries
Robin Smith
- 344 Energy Integration - a Fresh Look for a Changed Energy World
Bill Townsend, Alan Ryder, Cyril Collins
- 345 Combined Energy and Water Analysis for the Oil Sands Industry
Alberto Alva-Argaez, Luciana E. Savulescu, Abdelaziz Hammach
- 346 Enhanced Heat Transfer Technology Application in Crude Units for Saving Energy
Kirtan K. Trivedi, Tom Rudy
- 356 Extraction of Benzene from Wastewater Using Refinery Liquids by L-L Extraction Instead of Distillation
Ashok V. Naimpally, Marcia G. Zimmermann
- 357 Debottlenecking of Heat Exchanger Networks Using Optimum Pressure Drops
Mohammad Hassan Panjeshahi, Nassim Tahouni
- 367 Systematic in-Process Modification Approach for Enhanced Waste Energy Recovery in Gas Plants
Mahmoud Bahy Noureldin, Ahmed S. Aseeri, Ali H Al-Qahtani, Saleh Al Hashimi

Session 145 - Upgrading and Processing of Opportunity Crudes II

2nd session of same subject

CoChair: Priya Rangarajan

Chair: Jinwen Chen

- 368 Compositional Analysis of Opportunity Materials: Characterization of Heavy Crude Oil and Bitumen by Fourier Transform Ion Cyclotron Resonance Mass Spectrometry
Ryan P. Rodgers, Donald F. Smith, Geoffrey C. Klein, Tanner M. Schaub, Alan G. Marshall, Parviz Rahimi
- 372 The State-of-the-Art of Naphthenic Acid and Sulfidic Corrosion Evaluation and Prediction
Russell Kane, Elizabeth Trillo
- 390 Crude Oil Corrosivity Measurement Using Radioactive Tracer Technology
Douglas C. Eberle, Craig M. Wall, Martin B. Treuhaft
- 391 Effect of Naphthenic Acid Structure on Corrosion
Priya Rangarajan, Fred Holmes, Bruce Randolph
- 399 Biological Upgrading of Petroleum – Recent Developments and Research Needs
Abhijeet P. Borole
- 400 Market Developments for Opportunity Crude Processing
Stephen L. Jones

Session 175 - Control and Optimization in Refining II

2nd session of same subject

CoChair: Tim Olsen

- 401 New Techniques for Meeting New Product Spec and Products Demand under Catastrophic Failure through Multi Objective Multi Refinery Optimization
Ahmed S. Khogeer, M. Nazmul Karim
- 412 Optimization of the Benzine and Diesel Fuels Blending
Nickolai V. Lisitsyn, Nickolai V. Kuzichkin
- 416 Energy Management
Peter Stanley
- 417 Development and Implementation of Process Analytical Toolbox
Fangwei Xu, **Edgar Tamayo**, Biao Huang

Session 177 - Advances in Hydroprocessing III

3rd session of same subject

CoChair: Stuart Shih

Chair: Peter Kokayeff

- 419 Meeting the Challenge of Delayed Coker Naphtha Hydroprocessing
Terry A. Reid
- 420 Developing Knowledge from Spent Hydroprocessing Catalyst
Chemical Analysis
Terry A. Reid
- 421 Recombination: A Complicating Issue in FCC Naphtha
Desulfurization
Laura E. (Jones) Leonard, Peter Kokayeff
- 422 A Novel Oxidative Desulfurization (Oxyds) Process for Diesel and
Vgo
Tzong-Bin Lin, Hsun-Yi Huang, **Jyh-Haur Hwang**, Hung-Chung
Shen, Karl T. Chuang
- 432 Mathematical Modeling of a Trickle Bed Bio-Desulfurizer of Hydro-
Treated Diesel with Recycle for the Production of Ulsd (Ultra-Low
Sulfur Diesel)
Manasi Mukhopadhyay, **Prof. Ranjana Chowdhury**, Prof. Pinaki
Bhattacharya

Session 188 - Upgrading and Processing of Opportunity Crudes III

3rd session of same subject

CoChair: Priya Rangarajan

Chair: Jinwen Chen

- 442 Opportunity Crudes - Addressing the Challenges of Mechanical
Reliability
Jerold I. Danis
- 452 Crude Oil Management: Reduce Operating Problems While
Processing Opportunity Crudes
Larry Kremer
- 458 Metallurgy for Opportunity Crudes
Tim Ruggles
- 463 Impact of H₂s Scavengers and Other Tramp Amines on Refinery
Operations and Equipment Integrity
Lawrence R. White, Craig Winslow, James Rue
- 476 A Comprehensive Approach to Assessing Opportunity Crudes
Doug Milton, James Feather, Kenneth Bagnoli, James McLaughlin
- 477 Refinery Optimum Crude Blending and Operation
Kiyomi Meason

Session 215 - Control and Optimization in Refining I

This session offers an opportunity to hear about process control success stories within the refining and petrochemical industry. The preferred subject matter includes innovative solutions to process control issues along with the benefits of optimization programs. If you have a process

control application that would be interesting for others to learn about, please submit an abstract for approval.

CoChair: James Harris

Chair: Tim Olsen

- 487 Apriori Alarm Management during Project Feed Stage Using the Results from the Hazop
E. Michael Stafford, **Harry West**
- 488 User Approval of Safety Instrumented System Devices
Angela Summers
- 496 Advances in Abnormal Situation Prevention in Refineries and Petrochemical Plants
Ahmad A. Hamad, **Ravi Kant**
- 507 Strategic Proof Testing
Dr. William M. Goble
- 512 Fired Heater Safeguarding Survey
Edward M. Marszal

Session 216 - Control and Optimization in Refining III

3rd session of same subject

CoChair: Tim Olsen

- 526 A Self-Tuning Regulator for Fluid Catalytic Cracking Units
Felix Severino Farias Junior, Rubens Maciel Filho
- 527 Robust Dynamic Principal Component Analysis for Process Performance Monitoring
Daniel Castro-Rodriguez, Gary Montague, Elaine Martin
- 543 Wireless Instrumentation Enables New Best Practices in Monitoring and Automation
Clifford Lewis
- 544 Using Industrial Wireless Sensors to Monitor Safety Showers and Eye-Wash Stations
Doug Eberhart
- 545 Advanced Control Strategy to a Fermentation Process to Obtain Ethanol
E. R. Duarte, Laércio Ender, **R. Maciel Filho**

Session 220 - Fouling Mitigation

Today fouling mitigation in refineries is particularly critical. Since there is a shortage of refinery capacity, there are strong incentives for each refinery to maximize the days on stream. In addition, keeping insulating foulants off heat exchanger surfaces greatly reduces energy consumption and carbon dioxide emissions. Therefore, this session on fouling mitigation will review the causes of refinery fouling and case studies of fouling mitigation. Causes will include asphaltene fouling, corrosion induced fouling, and polymerization of conjugated olefins.

Mitigation methods include additives, oil compatibility prediction, heat exchanger design, heat exchanger inserts, and optimum cleaning scheduling.

CoChair: Kirtan K. Trivedi

Chair: Irv Wiehe

- 564 Petroleum Fouling: Causes, Tools, and Mitigation Methods
Irv Wiehe
- 579 **Newer Techniques to Control Fouling in Crude Pre-Heat Exchangers**
Mahesh Subramaniam, **Ramaswamy Perumangode**
- 581 Improved Crude Unit Design through Experimentation
Christopher A. Bennett, R. Stanley Kistler, Shakir Khambaty, Krish Nangia, Ahmad Al-Jemaz, Walid Al-Ghawas
- 582 Heat Exchanger Tube Inserts - an Update with New Applications in Crude Distillation Units, Vacuum Applications and Reboilers
ARTUR W. KRUEGER, Francois Pouponnot
- 598 Heat Exchanger Fouling Monitoring and Cleaning Optimization Using Opticlean
Joseph Davis Jr., **Diego Polanco**