

Fuels and Petrochemicals Division

**Core Programming Topic at the 2012 AIChE Spring Meeting
cpf '8th Global Congress on Process Safety**

**Houston, Texas, USA
1-5 April 2012**

ISBN: 978-1-62276-558-4

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571



Some format issues inherent in the e-media version may also appear in this print version.

Copyright© (2012) by AIChE
All rights reserved.

Printed by Curran Associates, Inc. (2012)

For permission requests, please contact AIChE
at the address below.

AIChE
3 Park Avenue
New York, NY 10016-5991

Phone: (203) 702-7660
Fax: (203) 775-5177

www.aiche.org

Additional copies of this publication are available from:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: 845-758-0400
Fax: 845-758-2634
Email: curran@proceedings.com
Web: www.proceedings.com

TABLE OF CONTENTS

Process Safety and Corporate Responsibility	N/A
<i>Michael Dolan</i>	
Future Fuels and Chemicals: Grand Challenges and Opportunities	1
<i>Joseph B. Powell</i>	
Advanced Trans-Alkylation (ATA) As a Means of Capturing Value: Productivity Improvement in Xylene Production	2
<i>Nicholas J. Kim</i>	
Preparation of Core-shell Microparticles by Cryotropic Gelation of Chitosan-based Biopolymers	13
<i>Wiwut Tanthapanichakoon, Kyuya Nakagawa, Nataporn Sowasod, Tawatchai Charinpanitkul</i>	
Removal of Phenol in Water by Alpha-, Beta- and Gamma-Cyclodextrin Polymer Particles	20
<i>Qingchuan Chen, Xiaolei Dong, Xuhong Guo, Li Li</i>	
Polyethersulfone (PES)/ Metal Oxides Nanocomposite Membranes: A Review of Performance Improvement for Water Treatment	21
<i>Fateme Sadat Shariatmadar, Mohsen Mohsen-Nia</i>	
A Comparative Study on Double Alkylation of Naphthalene with Long Chain Olefins Using Different Catalysts	29
<i>Ming Zhang, Zhiqiang He, Yun Fang</i>	
CO₂ Capture Via Potassium Carbonate/MEA Solution	30
<i>Yee Soong, Robert Dilmore, Sheila Hedges, D. E. Allen</i>	
Where Are the Opportunities for CO₂ Conversion?	32
<i>Lubo Zhou</i>	
CO₂ Reforming for Variable Chemical Process	33
<i>Osamu Hirohata, Tomoyuki Mikuriya, Mitsunori Shimura</i>	
Spectroscopic Studies of Gas-Liquid Reactions Using Microfluidics for the Study of CO₂ Conversion to High-Value Products	41
<i>Jesse Greener, Rachele Choueiri, Ethan Tumarkin, Milad Abolhasani, Axel Guenther, Eugenia Kumacheva</i>	
A Technoeconomic Analysis of Biodegradable Polymers Production From CO₂ and Waste Plastics	42
<i>Michael Hartmann, Maoqi Feng, Eloy Flores III</i>	
Mixed Fluid Cascade, Experience and Outlook	43
<i>Heinz C. Bauer</i>	
Fuel Gas System Design - Key to Reliable and Efficient LNG Plant Operation	51
<i>Pei-Han Yong, Christine Teh, Bindupriya Bandari, Robert Zinsmeister</i>	
Waste Heat Recovery Considerations in LNG Plants	64
<i>Douglas Wiles, Stanley Kwan, Vinod Rajkumar</i>	
Demonstration Test Result of High Pressure Acid-Gas Capture Technology (HiPACT)	77
<i>Koji Tanaka, Takehiro Komi, Yasushi Fujimara, Torsten Katz, Oliver Spuhl, Erick Contreras, Kumar Sugavanam</i>	
Application of Exergy Analysis for LNG Plants and Receiving Terminals	78
<i>Chen-Hwa Chiu, Lixin You</i>	
Maximizing LNG Capacity for Liquefaction Processes Utilizing Electric Motors	79
<i>Jonathan Berg, Yu-Nan Liu</i>	
The Economics of Process Measurements	80
<i>Douglas C. White</i>	
Applying Offline Tools to Reduce On-Site Control Implementation Effort	81
<i>Kenneth V. Allsford, Bhaskar V. Iyer, Aric Tomlins</i>	
Useful Tips for Optimal Fired Heater Performance	82
<i>Nikki Bishop, Barbara Hamilton</i>	
Abqaiq Plant Virtual Plant Model and RTO Implementation	88
<i>K. Y. Brian Peng, Saleh Al-Musallam</i>	
Dynamic Simulation of CGC System Under Ethylene Plant Turnarounds	96
<i>Chuanyu Zhao, Jie Fu, Qiang Xu</i>	
Dynamic Simulation of Demethanizer and Chilling Train System	97
<i>Shujing Zhang, Meiqian Wang, Karthik Krishnadevarajan, Qiang Xu, Kuyen Li, Dan F. Smith</i>	
Impact of Low Levels of Ammonia in Syngas on the Fischer-Tropsch Synthesis Performance of Cobalt and Iron Catalysts in Fixed-Bed Operation	98
<i>Heinz J. Robota, Johanna Alger, P. Julius Pretorius</i>	
The Synergism of Natural Gas Conversion with Biomass for Maximizing Biofuels Production	99
<i>Daniel Resasco, Lance Lobban, R. G. Mallinson</i>	

Utilization of Supercritical Fluids As Reaction Media for the Synthesis of Higher Alcohols From Syngas	100
<i>Rui Xu, Sihe Zhang, Christopher B. Roberts</i>	
Cleaner Conversion of Coal to Liquid Fuels with Proven Gasification Technology:	101
<i>Ravindra Agrawal</i>	
Determining the Rate of Biodegradation in Fuel Impacted Karst Aquifers	102
<i>Roger Painter, Tom Byl, Lonnie Sharpe, Tony Patterson</i>	
Prediction of Condenser Fouling in Thermoelectric Power Plant Cooling Systems	125
<i>Iman Safari, Michael E. Walker, Javad Abbasian, Hamid Arastoopour, Ming-Kai Hsieh, Ranjani B. Theregowda, David A. Dzombak, David C. Miller</i>	
A Combined Cost Model to Evaluate the Economic Impact of Degraded Water Use in Thermoelectric Cooling Loops	126
<i>Michael E. Walker, Ranjani B. Theregowda, Iman Safari, Ming-Kai Hsieh, Javad Abbasian, Hamid Arastoopour, David A. Dzombak, David C. Miller</i>	
Can Monochloramine Be Used to Control Biofouling in Recirculating Power Plant Cooling System Using Treated Municipal Wastewater?	127
<i>Shih-Hsiang Chien, David A. Dzombak, Radisav Vidic</i>	
A Statistical Approach to Prediction of Transmembrane Pressure in Membrane Bioreactors	128
<i>Hiromasa Kaneko, Kimito Funatsu</i>	
Sodium Plus Sulfur Promoted Supported Iron Catalysts for the Selective Production of Lower Olefins From Synthesis Gas	136
<i>Hirsa M. Torres Galvis, Johannes H. Bitter, Krijn P. De Jong</i>	
Hydroisomerization of n-Hexadecane Over Anion Modified Pt/HfO₂ Catalysts	137
<i>Muthu Kumaran Gnanamani, Gary Jacobs, Wilson D. Shafer, Dennis E. Sparks, Burtron H. Davis</i>	
Development of a Fischer-Tropsch Gasoline Process for the Steam Hydrogasification Technology	139
<i>Yang Li, J. M. Norbeck, C. S. Park</i>	
Direct Conversion of Gasified Biomass to Long Alcohols in Solid Hybrid-Nanoparticles At the Liquid-Liquid Interface of Water/Oil Emulsions	140
<i>Jimmy Faria, Daniel E. Resasco, Ali A. Rownaghi, Raymond L. Huhnke</i>	
Comprehensive Kinetic Model for Fischer-Tropsch Synthesis Over a Re-Promoted Co/Al₂O₃ Catalyst	141
<i>Branislav S. Todic, Tejas J. Bhatelia, Wenping Ma, Gary Jacobs, Burtron H. Davis, Dragomir B. Bukur</i>	
Progress on a Comprehensive and Flexible Fischer-Tropsch Synthesis Reactor Model	143
<i>Joseph W. Pratt</i>	
Maximizing Benefits in Selection of Gas Monetization Methodology: Transformed FLNG	144
<i>Joseph H. Cho, Henry Ha, Wan-Jae Lee</i>	
Advanced Technology Horizon of FLNG	157
<i>T. J. Kim, Kil Nam, Yoon Choon Kim, Jinsang Park</i>	
Application of the Anti-Sloshing Blanket to LNG Carriers and FLNG	167
<i>Sangeon Chun</i>	
Cost Effectiveness of 2-Row Membrane System for FLNG	168
<i>Herbert Moon</i>	
Gas Separation Membrane Tutorial	169
<i>Lubo Zhou</i>	
Cost-Effective Catalytic Membranes for H₂ Purification	170
<i>Bhanu Vardhan Reddy Kuncharam, Benjamin A. Wilhite</i>	
Offshore Gas Treatment Technology for Natural Gas	171
<i>Saadet Ulas Acikgoz, Shain Doong, Pengfei Chen, Lubo Zhou</i>	
A Novel Catalyst for Partial Oxidation of Natural Gas	172
<i>Nicholas Xu, Yu Wu</i>	
An Innovative Mixed Zinc Oxide Based Sorbent Regenerable At Low Temperature for the Desulfurization of Syngas in IGCC or XTL Processes	174
<i>Vincent Girard, Arnaud Baudot, David Chiche, Delphine Bazer-Bachi, Christophe Geantet</i>	
Musings on Management	176
<i>Frank Van Lier</i>	
Thermodynamic-Analysis-Based Design for Liquefied Natural Gas Receiving Terminal	177
<i>Meiqian Wang, Jian Zhang, Qiang Xu</i>	
Design Approaches for Unconventional Gas Processing	178
<i>John Harness</i>	
UCSRP: A Flexible Sulfur Removal Process for Sweetening Natural Gas	179
<i>Arun Basu, Howard Meyer, Dennis Leppin, Jim Zhou, Ajay Makkuni</i>	
Increasing Propane Desuperheater and Condenser Reliability in PT Badak NGL	187
<i>Mohammad Arief Setiawan</i>	

Absorption Refrigeration for Auxiliary Applications in LNG Plant	188
<i>Jordan Belue, Robert Havlik, Stanley Huang</i>	
Work Output of Multicomponent LNG Mixtures in Two-Phase Expanders	189
<i>Linda St-Cyr</i>	
Two-Phase Pump Expanders for Liquefied Propane Gas	192
<i>Hans E. Kimmel</i>	
Cryogenic Expander Application in Propane Liquefaction Process	193
<i>Michael Cords</i>	
A Photo Safari Though a Petroleum Refinery	194
<i>Matthew J. Reisdorf</i>	
Planning for a Career in Refining - What Every Chemical Engineer Must Know	195
<i>Shankar Vaidyanathan, Kevin Turini</i>	
From World Scale Refineries to State of the Art Nano Labs and Super Computers. From Coker to Clean Rooms, From KBPD to LPH. How to Translate Your Past Experience Into a Competitive Advantage?	196
<i>Ahmed Khogeer</i>	
Refinery-Wide Topics for Profitability, Reliability and Safety	197
<i>Mike Siravo</i>	
Modern Loop Tuning Tutorial	203
<i>Tim Olsen, Jim Dunbar</i>	
Switching Between Hydrogenolysis and Bifunctional Hydrocracking on An Unsulfided Co/MoO₃/SiO₂-Al₂O₃ Catalyst	210
<i>Heinz J. Robota, Jhoanna Alger</i>	
The Effect of Chain Length of Feed on Hydrocracking Over Pt/SiO₂-Al₂O₃ Catalyst	211
<i>Jungshik Kang, Wenping Ma, Wilson D. Shafer, Keogh Robert, Gary Jacobs, Burtron H. Davis</i>	
Middle Distillates Production Via Fischer Tropsch Synthesis with Product Upgrading Under Supercritical Phase Conditions	212
<i>Sihe Zhang, Rui Xu, J. Ed Durham, Christopher B. Roberts</i>	
Oxygenate/Hydrocarbon Distribution Compared Across Different Group I Promoters for Iron Catalysts	213
<i>Wilson D. Shafer, Robert A. Keogh, Burtron H. Davis</i>	
Synthesis of PVA Based Membranes Modified by Benzimidazole Group for Direct Methanol Fuel Cells	215
<i>Pratima Gajbhiye, Jayant K. Singh, Anil Kumar</i>	
Operation and Controls of Operating Direct Methanol Fuel Cells with PVA Based Membranes Modified by Benzimidazolium Groups	218
<i>Pratima Gajbhiye, Pranjali Joshi, Jayant K. Singh, A. Kumar</i>	
Numerical Investigation in Heat Conduction Effect on Heat Exchange for Mini Cross-Flow Heat Exchanger (MCHE)	221
<i>Hongyue Duan, Wei Mu, Xigang Yuan, Lingai Luo</i>	
The Effects of Out Gassing Through Cylindrical Walls on the Transport Coefficients	222
<i>Luma H. Yaseen, Nada B. Nakkash, M. N. Latif</i>	
Down the Hubbert Curve	223
<i>Ian Sutton</i>	
Statistical Decision Making for In-Service Inspection of Underground Waste Storage Tanks	224
<i>Emily Mitchell, Stephen P. Harris</i>	
Thermal Inbreathing Requirements of Low Pressure Storage Tanks At Elevated Temperatures	225
<i>Donald E. Brooks</i>	
Dynamic Operational Risk Assessment with Bayesian Networks	226
<i>Shubharthi Barua, Xiaodan Gao, M. Sam Mannan</i>	
Comparing the Performance of Compact Heat Exchange Reactor to CSTR for Fischer Tropsch Synthesis	233
<i>Hani Gadalla, Zhijun Jia, Steven J. Vallee, Burtron H. Davis, Dennis Sparks</i>	
Advances in FCC Propylene Production and Recovery	234
<i>Andrew Mezera</i>	
Reforming Regeneration Offgas Treatment	N/A
<i>Ka Lok</i>	
An Experimental Study of Sulfur Release in Gas Products of Coal Steam Hydrogasification	235
<i>Qian Luo, Chan S. Park, Joseph M. Norbeck</i>	
An Innovative Mixed Zinc Oxide Based Sorbent Regenerable At Low Temperature Used for the Desulfurization of Syngas in IGCC or XTL Processes	236
<i>Vincent Girard, Arnaud Baudot, David Chiche, Delphine Bazer-Bachi, Christophe Geantet</i>	

Tuning Equation-of-State to Match Experimental Data for near Critical Fluid: A Case Study of NKJ	238
<i>Adel Elsharkawy, Bashayer Al-Enize</i>	
Dynamic Simulation: Value During LNG Process Design and Beyond	239
<i>Kenneth V. Allsford, Vijay Kumarpatel, Robin K. Conwell</i>	
Evaluation of Reverse Osmosis - Electrode-ionization Pilot Project in PT Badak NGL	240
<i>Fany Arfianto</i>	
Reducing Black Smoke and CO₂ Emissions in PT Badak's Ground Flare	247
<i>Ferry A. Perdana</i>	
Modeling of Ground Flare Pits	248
<i>Nicolas F. Ponchaut, Harri K. Kytomaa, Christopher Desautels, Shoichi Kaganoi, Olivier Becu, Gareth Cardiff</i>	
Anti-Surge Methods for the Base Load LNG Plant Propane Compressor	261
<i>J. C. Kuo</i>	
Getting the Most Out of Your Refinery Hydrogen Network	262
<i>Alan Zagoria</i>	
Heat Exchange Reforming for Increased Hydrogen Production	263
<i>Niels R. Udengaard, Jack H. Carstensen</i>	
Contaminant Resistant High-Temperature Hydrogen Purification Membrane	275
<i>Siu-Yue Tam, Andy Tsai, Ying-Bing Jiang</i>	
Composite Catalytic-Permselective Membranes for H₂ Purification	276
<i>Daejin Kim, Elva Romero, Benjamin Wilhite</i>	
Catalytic Strategies for Upgrading Pyrolysis Vapors	277
<i>Shaolong Wan, Xiaohan Zhang, Daniel Resasco, Lance Lobban, R. G. Mallinson</i>	
Fischer-Tropsch Synthesis Using a Pilot Scale Fixed Bed Compact Heat Exchange Reactor	278
<i>Steven J. Vallee, Zhijun Jia, Hani Gadalla</i>	
Conceptual Design and Integration of XTL Plants	279
<i>Mohamed Noureldin, Buping Bao, Nimir O. Elbashir, M. M. El-Halwagi</i>	
Evaluation of Dispersion Models for LNG Siting Applications	280
<i>Andrew Kohout</i>	
Modeling Dynamic Heat Transfer in Piping Systems Using An Enhanced ASTM C-680 Algorithm	281
<i>Debby Sielegar, David Messersmith</i>	
Theoretical Study of Expansion Foam Application on LNG Pool Using Computational Fluid Dynamics	294
<i>Bin Zhang, Xinrui Li, M. Sam Mannan, Ammar Alkhalwaldeh</i>	
Guidelines for Jetting and Flashing LNG Vapor Exclusion Zone Analysis	295
<i>Delmar R. Morrison, Ryan J. Hart, Harri K. Kytomaa</i>	
Effect of LNG Chemical Composition on Consequence Assessment	314
<i>Xiaodan Gao, Yi Liu, Luc Vechot, Tomasz Olewski, M. Sam Mannan</i>	
Source Term Modeling of Vapor Cloud Formation During a Cryogenic Liquid Spill Based on a Boiling Model by CFD Method	315
<i>Yi Liu, Tomasz Olewski, Luc Vechot, Xiaodan Gao, Sam Mannan</i>	
Author Index	