

12th Topical Conference on Gas Utilization 2012

Topical Conference at the 2012 AIChE Spring Meeting and 8th Global Congress on Process Safety

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

ISBN: 978-1-62276-566-9

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>	
CO₂ Capture Via Potassium Carbonate/MEA Solution	2
<i>Yee Soong, Robert Dilmore, Sheila Hedges, D. E. Allen</i>	
Where Are the Opportunities for CO₂ Conversion?	4
<i>Lubo Zhou</i>	
CO₂ Reforming for Variable Chemical Process	5
<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	13
<i>Jesse Greener, Rachelle Choueiri, Ethan Tumarkin, Milad Abolhasani, Axel Guenther, Eugenia Kumacheva</i>	
A Technoeconomic Analysis of Biodegradable Polymers Production From CO₂ and Waste Plastics	14
<i>Michael Hartmann, Maoqi Feng, Eloy Flores III</i>	
Mixed Fluid Cascade, Experience and Outlook	15
<i>Heinz C. Bauer</i>	
Fuel Gas System Design - Key to Reliable and Efficient LNG Plant Operation	23
<i>Pei-Han Yong, Christine Teh, Bindupriya Bandari, Robert Zinsmeister</i>	
Waste Heat Recovery Considerations in LNG Plants	36
<i>Douglas Wiles, Vinod Rajkumar, Stanley Kwan</i>	
Demonstration Test Result of High Pressure Acid-Gas Capture Technology (HiPACT)	49
<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	50
<i>Chen-Hwa Chiu, Lixin You</i>	
Maximizing LNG Capacity for Liquefaction Processes Utilizing Electric Motors	51
<i>Jonathan Berg, Yu-Nan Liu</i>	
Impact of Low Levels of Ammonia in Syngas on the Fischer-Tropsch Synthesis Performance of Cobalt and Iron Catalysts in Fixed-Bed Operation	52
<i>Heinz J. Robota, Johanna Alger, P. Julius Pretorius</i>	
The Synergism of Natural Gas Conversion with Biomass for Maximizing Biofuels Production	53
<i>Daniel Resasco, Lance Lobban, R. G. Mallinson</i>	
Utilization of Supercritical Fluids As Reaction Media for the Synthesis of Higher Alcohols From Syngas	54
<i>Rui Xu, Sihe Zhang, Christopher B. Roberts</i>	
Cleaner Conversion of Coal to Liquid Fuels with Proven Gasification Technology:	55
<i>Ravindra Agrawal</i>	
Sodium Plus Sulfur Promoted Supported Iron Catalysts for the Selective Production of Lower Olefins From Synthesis Gas	56
<i>Hirsa M. Torres Galvis, Johannes H. Bitter, Krijn P. De Jong</i>	
Hydroisomerization of n-Hexadecane Over Anion Modified Pt/HfO₂ Catalysts	57
<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	59
<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	60
<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	61
<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	63
<i>Joseph W. Pratt</i>	
Maximizing Benefits in Selection of Gas Monetization Methodology: Transformed FLNG	64
<i>Joseph H. Cho, Henry Ha, Wan-Jae Lee</i>	
Advanced Technology Horizon of FLNG	77
<i>T. J. Kim, Kil Nam, Yoon Choon Kim</i>	
Application of the Anti-Sloshing Blanket to LNG Carriers and FLNG	87
<i>Sangeon Chun</i>	

Cost Effectiveness of 2-Row Membrane System for FLNG	88
<i>Herbert Moon</i>	
Gas Separation Membrane Tutorial	89
<i>Lubo Zhou</i>	
Cost-Effective Catalytic Membranes for H₂ Purification	90
<i>Bhanu Vardhan Reddy Kuncharam, Benjamin A. Wilhite</i>	
Offshore Gas Treatment Technology for Natural Gas	91
<i>Saadet Ulas Acikgoz, Shain Doong, Pengfei Chen, Lubo Zhou</i>	
A Novel Catalyst for Partial Oxidation of Natural Gas	92
<i>Nicholas Xu</i>	
An Innovative Mixed Zinc Oxide Based Sorbent Regenerable At Low Temperature for the Desulfurization of Syngas in IGCC or XTL Processes	94
<i>Vincent Girard, Arnaud Baudot, David Chiche, Delphine Bazer-Bachi, Christophe Geantet</i>	
Musings on Management	96
<i>Frank Van Lier</i>	
Thermodynamic-Analysis-Based Design for Liquefied Natural Gas Receiving Terminal	97
<i>Meiqian Wang, Jian Zhang, Qiang Xu</i>	
Design Approaches for Unconventional Gas Processing	98
<i>John Harness</i>	
UCSRP: A Flexible Sulfur Removal Process for Sweetening Natural Gas	99
<i>Arun Basu, Howard Meyer, Dennis Leppin, Jim Zhou, Ajay Makkuni</i>	
Increasing Propane Desuperheater and Condenser Reliability in PT Badak NGL	107
<i>Mohammad Arief Setiawan</i>	
Absorption Refrigeration for Auxiliary Applications in LNG Plant	108
<i>Jordan Belue, Robert Havlik, Stanley Huang</i>	
Work Output of Multicomponent LNG Mixtures in Two-Phase Expanders	109
<i>Linda St-Cyr</i>	
Two-Phase Pump Expanders for Liquefied Propane Gas	112
<i>Hans E. Kimmel</i>	
Cryogenic Expander Application in Propane Liquefaction Process	113
<i>Michael Cords</i>	
Switching Between Hydrogenolysis and Bifunctional Hydrocracking on An Unsulfided Co/MoO₃/SiO₂-Al₂O₃ Catalyst	114
<i>Heinz J. Robota, Jhoanna Alger</i>	
The Effect of Chain Length of Feed on Hydrocracking Over Pt/SiO₂-Al₂O₃ Catalyst	115
<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	116
<i>Sihe Zhang, Rui Xu, J. Ed Durham, Christopher B. Roberts</i>	
Oxygenate/Hydrocarbon Distribution Compared Across Different Group I Promoters for Iron Catalysts	117
<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	119
<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	122
<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)	125
<i>Hongyue Duan, Wei Mu, Xigang Yuan, Lingai Luo</i>	
The Effects of Out Gassing Through Cylindrical Walls on the Transport Coefficients	126
<i>Luma. H. Yaseen, Nada B. Nakkash, M. N. Latif</i>	
Down the Hubbert Curve	127
<i>Ian Sutton</i>	
Statistical Decision Making for In-Service Inspection of Underground Waste Storage Tanks	128
<i>Emily Mitchell, Stephen P. Harris</i>	
Thermal Inbreathing Requirements of Low Pressure Storage Tanks At Elevated Temperatures	129
<i>Donald E. Brooks</i>	
Dynamic Operational Risk Assessment with Bayesian Networks	130
<i>Shubharthi Barua, Xiaodan Gao, Sam Mannan</i>	

Comparing the Performance of Compact Heat Exchange Reactor to CSTR for Fischer Tropsch Synthesis	137
<i>Hani Gadalla, Zhijun Jia, Steven J. Vallee, Burtron H. Davis, Dennis Sparks</i>	
Advances in FCC Propylene Production and Recovery	138
<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	139
<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	140
<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	142
<i>Adel Elsharkawy, Bashayer Al-Enize</i>	
Dynamic Simulation: Value During LNG Process Design and Beyond	143
<i>Kenneth V. Allsford, Vijay Kumarpatel, Robin K Conwell</i>	
Evaluation of Reverse Osmosis - Electrode-ionization Pilot Project in PT Badak NGL	144
<i>Fany Arfianto</i>	
Reducing Black Smoke and CO2 Emissions in PT Badak's Ground Flare	151
<i>Ferry A. Perdana</i>	
Modeling of Ground Flare Pits	152
<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	165
<i>J. C. Kuo</i>	
Getting the Most Out of Your Refinery Hydrogen Network	166
<i>Alan Zagoria</i>	
Heat Exchange Reforming for Increased Hydrogen Production	167
<i>Niels R. Udengaard, Jack H. Carstensen</i>	
Contaminant Resistant High-Temperature Hydrogen Purification Membrane	179
<i>Siu-Yue Tam, Andy Tsai, Ying-Bing Jiang</i>	
Composite Catalytic-Permselective Membranes for H2 Purification	180
<i>Daejin Kim, Elva Romero, Benjamin Wilhite</i>	
Catalytic Strategies for Upgrading Pyrolysis Vapors	181
<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	182
<i>Steven J. Vallee, Zhijun Jia, Hani Gadalla</i>	
Conceptual Design and Integration of XTL Plants	183
<i>Mohamed Noureldin, Buping Bao, Nimir O. Elbashir, M. M. El-Halwagi</i>	
Evaluation of Dispersion Models for LNG Siting Applications	184
<i>Andrew Kohout</i>	
Modeling Dynamic Heat Transfer in Piping Systems Using An Enhanced ASTM C-680 Algorithm	185
<i>Debby Stielegar, David Messersmith</i>	
Theoretical Study of Expansion Foam Application on LNG Pool Using Computational Fluid Dynamics	198
<i>Bin Zhang, Xinrui Li, M. Sam Mannan</i>	
Guidelines for Jetting and Flashing LNG Vapor Exclusion Zone Analysis	199
<i>Delmar R. Morrison, Ryan J. Hart, Harri K. Kytomaa</i>	
Effect of LNG Chemical Composition on Consequence Assessment	218
<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	219
<i>Yi Liu, Tomasz Olewski, Luc Vechot, Xiaodan Gao, Sam Mannan</i>	
Designing LNG Vapor Dispersion Exclusion Zones to Protect the Public	220
<i>Jerry Havens, Heather Walker</i>	
Service Life Prediction of 9% Ni Steel LNG Storage Tank Using Fatigue Analysis	229
<i>Seung-Rim Lee, Jang Sik Park, Jong Kyu Sung</i>	
Evaluation of Key Parameters for Designing Effective Water Curtain Systems for LNG Facilities Using Computational Fluid Dynamics	239
<i>Byung Kyu Kim, Dedy Ng, Ray Mentzer, M. Sam Mannan</i>	
CFD Simulation of the Falcon Tests Using the Homogeneous Equilibrium Model in FLACS	247
<i>Mathieu Ichard, Filippo Gavelli</i>	

Validation of PHAST Dispersion Model As Required for USA LNG Siting Applications	263
<i>Henk W. M. Witlox, Mike Harper, Robin Pitblado</i>	
Modeling of LNG Spills Into Trenches and Troughs.....	276
<i>Nicolas F. Ponchaut, Alfonso F. Ibarreta, Harri K. Kytomaa</i>	
Author Index	