JEFFREY A. AMELSE, Ph.D.
UNIVERSIDADE DE AVEIRO, PORTUGAL
Departamento de Química, CICECO
RETIRED FROM BP AMOCO CHEMICAL COMPANY, NAPERVILLE, ILLINOIS
+1-630-779-9128 (Cell)
+351 927 313 896 (Portuguese Cell)
E-MAIL: AmelseJeff@gmail.com; JAmelse@UA.Pt

Education and Training

Ph.D., Chem. Eng., Northwestern University, Evanston, IL 1980

Dissertation Title: Silica Supported Iron Bimetallic Catalysts for the Fischer-Tropsch Synthesis, Catalyst Characterization and Performance

Advisors: Professors John Butt (Chem. Eng.) and Lyle Schwartz (Material Science)

M.S., Chem. Eng., Northwestern University, Evanston, IL 1977

B.S., Chem. Eng., University of Illinois, Champaign-Urbana 1975

Numerous continuing education classes on refining and petrochemical technologies.

Relevant Skills

Expert in molecular sieve synthesis, catalysis, and process design and economics. Proficient in ASPEN process simulation and HTRI heat exchanger design software. Deep understanding of the aromatics market place, pricing, and competing aromatics technologies.

Relevant Work Experience

UNIVERSIDADE DE AVEIRO, PORTUGAL 2017-present
DEPARTMENTO DE QUIMICA, CICECO

Invited Principal Investigator **2017-present**

Lecturing on Bioethanol, Biodiesel, Biofuels from Cellulosic Biomass, Refining, and Petrochemicals

Research on Cu-SSZ-13 vehicle SCR NOX reduction Catalysts using solid state NMR as primary characterization tool.

BP AMOCO CHEMICAL COMPANY 1982 – present

Aromatics New Technology **2006 - present**

Core Design Team Member for the Reliance PX4 Unit at Jamnagar, India that will utilize BP pX crystallization technology. This will be the largest pX unit in the world.

Core Team Member of the BP/Lummus JV to license BP pX catalysts and the pX crystallization process.

Core Design Team Member for the conceptual BP pX Unit Plant of the Future.

Principle Investigator of U.S. Dept. of Energy sponsored project to develop Ammonia Absorption Refrigeration to replace C3 refrigeration in BP crystallization processes.

Developed next generation pX isomerization molecular sieves, catalysts and pX isomerization processes. One had been chosen for commercial implementation at Geel in 2017, but is now shelved due to difficulties with preferred alumina supply.

Recipient of special grant from the BP Head of Technology, Downstream to sponsor a Post-Doc at the University of Aveiro, Portugal to characterize BP HAMS-1B-3 borosilicate molecular sieve and alumina supported catalysts via SS NMR spectroscopy.

Recipient of special grant from the BP Distributed Research Laboratory (DRL) to sponsor a Masters student at Cambridge University, U.K. to characterize the BP HAMS-1B borosilicate molecular sieve and alumina supported catalysts by wet chemistry, XRD, and neutron diffraction.

Performed scoping process designs and economics for alternate routes to pX (bio-based, methanol to aromatics (MTA), Selective Toluene Alkylation (STA), and TOL/A9+ transalkylation.

Instructor for internal courses on BP pX catalysis and process technologies.

pX Benchmarking and Competitive Intelligence **2004 - 2006**

As Topic Leader, compiled data for external pX benchmarking studies that showed BP crystallization commercial units are first quartile in energy consumption. This formed the basis for a BP pX process licensing effort.

Developed and implemented BP owned pX unit proprietary energy gap closure projects.

Global Aromatics Technology Group **1990 - 2004**

Worked on two potential Amoco pX JV's in Europe. Responsible for heat and material balances and major equipment design. Prepared Process Design Package (PDP) in contractor's office for one before discontinuing to work on the design of the BP Amoco wholly owned pX unit at Geel, Belgium.

R&D Lead and Core Team Member for Geel pX unit design. Spent six

months in the contractor's office (Foster-Wheeler, Reading, U.K.) through the DEFINE phase. Member of start-up team. Provided process monitoring and improvement. Engineered 2005 Geel mini-debottleneck. Continue to monitor catalyst and unit performance.

Conceived, developed and designed Geel Light Aromatics Fractionation (LAF) unit to produce high purity benzene by direct fractionation of pX light aromatics byproducts.

2,6-Dimethylnaphthalene (2,6-DMN) Process Development Group **1988 - 1990**

2,6-DMN is made via 4 reaction steps: side chain alkenylation of oX to form OTP; cyclization of OTP to form 1,5-DMT; dehydrogenation of 1,5-DMT to 1,5-DMN, and isomerization of 1,5-DMN to 2,6-DMN.

Developed catalysts and reactor models for the dehydrogenation and isomerization steps, including a patented low acidity dehydrogenation catalyst, and a Wei-Prater kinetic model for isomerization within the 2,6-DMN isomer triad. Provided input for the process design.

pX Catalyst Development and Process Design **1982 - 1988**

Developed pX reactor models for ethylbenzene (EB) transalkylation-type and EB dealkylation-type xylene isomerization catalysts that continue to be used in BP ASPEN pX unit simulations

Directed infrared spectroscopy characterization of AMSAC (Amoco Molecular Sieve on Alumina Catalysts) in support of Amoco's defense in litigation with Mobil Oil.

Performed C-14 tracer studies that illustrated a shape selective shift in the mechanism of ethyl transfer reactions and its effect on the ability to hydrodeethylate EB and suppress xylene loss reactions.

Developed Wei-Prater reactor models for xylene isomerization and as a subset, developed an experimental method for accurately determining true xylene isomerization equilibrium from the intersection of the eigenvectors of the rate constant matrices for large pore and shape selective medium pore molecular sieve catalysts.

Developed ASPEN simulations for adiabatic catalyst regeneration that guided regeneration procedures that are both inherently safe and prevent catalyst damage. Provided design conditions for now proven nitrogen regeneration to replace expensive and national resource wasteful helium regeneration.

Developed catalysts and processes for EB conversion/xylene isomerization in the vapor phase, liquid-phase, and at supercritical temperature and pressure

BELL LABORATORIES, MURRAY HILL, NJ **1980 - 1982**

Member of Technical Staff

Developed a process to recover germanium (a rare and expensive element) from the effluents of optical fiber manufacture.

Issued Patents and Patent Applications

WO 2015/123065 A1, Amelse, J. A., "Energy Efficient Fractionation Process for Separating the Reactor Effluent From TOL/A9+ Transalkylation Processes" (2015).

WO 2015/094563 A1, Amelse, J. A., "Energy Efficient Naphthene Recycle via the Use of a Sidedraw Fractionation Tower and Partial Condensation" (2015).

WO 2014/152762 A1, Norwood, S., Lin, C., Amelse, J. A., Roberts, S. A., Wilsak, R., Colling, C., "Process for Recovering Paraxylene From at Least Two Feedstreams Containing Xylene Isomers" (2014).

WO 2014/150875 A1, Nubel, P. O., Amelse, J. A., "MFI Aluminosilicate Molecular Sieves and Methods for Using Same for Xylene Isomerization" (2014).

WO 2014/150863 A1, Amelse, J. A., "Boroaluminosilicate Molecular Sieves and Methods for Using Same for Xylene Isomerization" (2014).

US 2012/0178980 A1, Amelse, J. A., "Method of Making and Using a Hydrocarbon Conversion Catalyst" (2012).

US 7,405,340, Amelse, J. A., "Process for the Crystallization Recovery of Para-xylene Utilizing Ammonia Absorption Refrigeration" (2008).

EP 1676901, Reyneke, R., Foral, M. J., and Amelse, J. A., "Refrigeration System for the Production and Recovery of Olefins" (2006).

US 5,189,234, Amelse, J. A., "Selective Dehydrogenation Processes and Catalysts" (1995).

US 5,401,705, Amelse, J. A., "Selective Dehydrogenation Catalysts" (1995).

US 5,050,788, Amelse, J. A., and Kutz, N.A., "Catalyzed Xylene Isomerization Under Supercritical Temperature and Pressure Conditions" (1991).

US 4,962,258, Amelse, J. A., and Kutz, N.A., "Liquid-Phase Xylene

Isomerization" (1990).

US 4,899,010, Amelse, J. A., and Reichmann, M. G., "Process for Isomerization of Unextracted, Ethylbenzene-Containing Xylene Feeds" (1990).

US 4,385,915, Amelse, J. A., Bohrer, M. P., Wood, D. L., "Removal of Germanium From the Effluent of Processes for the Production of Optical Components" (1982).

Published Works and Presentations

Hough, A., Routh, A. F., Clarke, S. M., Wiper, P. V., Mafra, L., Amelse, J. A., "Boron removal and reinsertion studies in ^{10}B-^{11}B exchanged HAMS-1B (H-[B]-ZSM-5) borosilicate molecular sieves using solid-state NMR, J. Catal., 334 (2016) 14–22.

Wiper, P. V., Amelse, J. A., Mafra, L., "Multinuclear solid-state NMR characterization of the Brønsted/Lewis acid properties in the BP HAMS-1B (H-[B]-ZSM-5) borosilicate molecular sieve using adsorbed TMPO and TBPO probe molecules," J. Catal., 316 (2014) 240–250.

Roberts, S., Amelse, J., and Colling, C., "BP's Energy Efficient Technology for the Production of Para-xylene," Paper ID : 20101024, Petrotech-2010, New Delhi, India, 31 October-3 November 2010.

Amelse, J. A., and Pinsent, L. M., "A Wei-Prater Kinetic Model for Xylene Isomerization Over the BP Amoco HSDE Catalyst," Paper 93a, AIChE 2004 Spring National Meeting, New Orleans, LA, April 25-29 (2003).

Amelse, J. A., Norwood, S. D., Mixon, W., "A Radioactive Tracer Study of Gas and Liquid Distribution in Horizontal CEN Paraxylene Unit Feed/Effluent Heat Exchangers,", Paper 32a, AIChE 2004 Spring National Meeting, New Orleans, LA, April 25-29 (2003).

Amelse, J. A., Jackson, P. L., Erickson, D. C., Panchal, C. B., Anand, G., Makar, E., Ganesan, K. D., and Cato, A., "pX Processes That Utilize Waste Heat Powered Ammonia Absorption Refrigeration," Paper 40c, AIChE 2004 Spring National Meeting, New Orleans, LA, April 25-29 (2003).

J. A. Amelse, "The Influence of Diffusion Limitations on Xylene Isomerization," Proc. 9th Intl. Zeolite Conf., Montreal, p. 457 (1992).

Amelse, J. A., "The Performance of Amoco's AMSAC Xylene Isomerization Catalysts," AIChE Summer National Meeting, Denver, CO, Aug. 21-24 (1988).

Amelse, J. A., "A Shape Selective Shift in the Mechanism of Transethylation and its Effect on the Ability to Hydrodeethylate

Ethylbenzene," Studies in Surf. Sci. Catal., Vol. 38, J. W. Ward, ed., p. 165 (1987).

Amelse, J. A., Nerheim, A. G., and Full, P. R., "An Infrared Spectroscopic Investigation of the AMS-1B Crystalline Borosilicate Molecular Sieve Incorporated in an Alumina Matrix: A Symposium in Honor of Professor Michel Boudart," Adv. Catal. Chem III (1985).

Amelse, J. A., Nerheim, A. G., and Full, P. R., "An Infrared Spectroscopic Investigation of the AMS-1B Crystalline Borosilicate Molecular Sieve Incorporated in an Alumina Matrix," Preprints of Poster Papers, Paper 3A-7, 7th Intl. Zeolite Conf., Tokyo, Japan (1986).

Bohrer, M., Amelse, J., Narasimham, P., Tariyal, B., Turnipseed, J., Gill, R., Moebuis, W., and Bodeker, J. A Process for Recovering Germanium From Effluents of Optical Fiber Manufacturing, J. Lightwave Tech., 3(3), 1985, 699-705.

Amelse, J. A., Arcuri, K. B., Butt, J. B., Matyi, R. J., Schwartz, L. H., Shapiro, A., "Particle size determination in supported iron oxide (alpha-Fe_2O_3)," J. Phys. Chem., 85(6), 1981, 708-711.

Amelse, J. A., Grynkewich, G., Butt, J. B., Schwartz, L. H., "Mössbauer spectroscopic study of passivated small particles of iron and iron carbide," J. Phys. Chem., 85(17), 1981, 2484-2488.

Amelse, J. A., Schwartz, L. H., Butt, J. B., "Iron Alloy Fischer-Tropsch Catalysts III. Conversion Dependence of Selectivity and Water-Gas Shift," J. Catal., 72, 1981, 95-110.

Amelse, J. A., Butt, J. B., Schwartz, L. H., "Carburization of Supported Iron Synthesis Catalysts," J. Phys. Chem., 82(5), 1978, 558-563.