NADER VAHDAT
Chemical Engineering Department
Tuskegee University
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SUMMARY

Forty years of experience in Chemical Engineering Education and research. Expertise include: Curriculum development for chemical engineering, including new options in environmental engineering, biochemical engineering and pre-med. Development of a graduate program in chemical engineering; Adsorption of vapors and liquids on solids and its application in air pollution monitoring, water and waste water treatment and analysis, and respirator cartridges; Chemical polymer interaction with application in protective clothing materials, and membrane separation; Development of air monitoring instruments for aerosols and vapors; Development of fire extinguishing agents; Carbon dioxide capture from flue gas in power plants.

EDUCATION

Ph.D. University of Manchester, England; Chemical Engineering
M.S. University of California, Berkeley ; Chemical Engineering
B.S. Abadan Institute of Technology ; Chemical Engineering

EMPLOYMENT

1981-Present Tuskegee University, Professor of Chemical Engineering
1979-1980 University of Wisconsin, Madison, Chemical Engineering
1975-1979 Abadan Institute of Technology, Chemical Engineering

PROFESSIONAL ACTIVITIES

Consultant for chemical engineering, environmental and safety projects
Major clients : Phillips Petroleum (Bartlesville OK)
American Technology (Baltimore MD)
Lawrence Livermore National Laboratory (CA)

PROFESSIONAL AFFILIATIONS

Member American Institute of Chemical Engineers
Member American Society of Engineering Education
Licensed Professional Engineer (Alabama Certificate No 16174).

EXPERIENCES

1. Education
   Development of chemical engineering curriculum to include the latest technology in the courses offered. Initiation of options in environmental engineering, biochemical engineering and pre-med in the program. Development of a master of science in chemical engineering.

2. Air Pollution and Water Treatment
   Design of adsorption columns for removing pollutants from air or water. Development of chemical exposure monitors; use of solid adsorbents to determine levels of pollutants in air.

3. Air Monitoring Instruments
   Development of air monitoring instruments for aerosols and vapors. Projects in progress include real-time air monitoring instrument for beryllium using Laser-Induced Breakdown Spectroscopy, development of a gas detection system for NASA Kennedy Space Center.

4. Permeation of chemicals through polymers, Measurement of permeation rate, diffusion coefficient and solubility. Permeation of multicomponent mixtures through elastomers. Prediction of transport properties (e.g. diffusion coefficient) from the properties of polymers and chemicals.

5. Membrane Separations
   Separation of organic compounds by polymeric membranes. Transport mechanism of small molecules in polymers. Membrane processes for the separation of gas and liquid mixtures. Pervaporation-Application of membrane technologies to industrial membrane process.

6. Adsorption
   Adsorption of mulicomponent mixtures on solids, Development of a model to predict the adsorption of binary mixtures on solids.

7. Fire Extinguishing agents
   Development of alternatives for halon replacements.

8. Carbon dioxide capture technologies
   Development of models to estimate cost of CO_2 capture from flue gas using technologies such as absorption, membrane separation and adsorption.

PUBLICATIONS

“Chemical Reaction Experiment of the Anthracene Hydrogen System for Undergraduate Laboratory." Chemical Engineering Education, 2l (l), 30 (l987).

"Permeation of Polymeric Materials by Toluene." Am. Ind. Hyg. Assoc. J., 48(2), 155-159 (l987).

"Permeation of Polymeric Materials by Methylene Chloride and Perchloroethylene", Am. Ind., Hyg. Assoc. J., 48 (7), 646 (l987).

"Permeation of Polymeric Materials by Chemicals, A comparison of 25 mm and 50 mm ASTM Cells", Performance of Protective Clothing: Second Symposium, ASTM STP 989, S. Z. Mansdorf, R. Sager, and A. P. Nelsen, eds., American Society for Testing and Materials, Philadelphia, l988, pp. 2l9-225.

"Decontamination of Chemical Protective Clothing", Am. Ind. Hyg. Assoc. J., 50 (3), l52 (l989).

"Influence of Temperature on the Permeation Properties of Protective Clothing Material". Chemical Protective Clothing Performance in Chemical Emergency Response, ASTM STP l037, Jimmy L. Perkins and Jeffrey O. Stull editors, American Society for Testing and Materials, Philadelphia, (l989).

"Estimation of Diffusion Coefficients for Solute-Polymer Systems", J. Appl. Polym. Sci., 42, 3l65 (l99l).

"Permeation of Binary Liquid Mixtures Through Elastomers", J. Appl. Polym. Sci. 44, l233-l243 (l992).

"Solubility of Binary Liquid Mixtures in Polymeric Materials", J. Appl. Polym. Sci., 50, 1833-1839 (1993).

"Prediction of Adsorption of Binary Mixtures on Adsorbents used in Respirator Cartridges and Air Sampling Monitors" Am. Ind. Hyg. Assoc. J., 55, 909-917 (1994).

"Adsorption Capacity and Thermal Desorption Efficiency of Selected Adsorbents " Am. Ind. Hyg. Assoc. J., 56, 32-38 (1995).

"Developing and Applying a Material Specification for NASA's Propellant Handlers Ensemble" Performance of Protective Clothing: Fifth Volume, ASTM STP 1237, James S. Johnson and S. Z. Mansdorf, Eds., American Society for Testing and Materials, Philadelphia, 1995.

"Permeation of Chemicals Through Glove Box Glove Materials" Appl. Occup. Environ. Hyg., 10 (11), 943-950 (1995).

"Theoretical Studies of the Performance of Activated Carbon in the Presence of Binary vapor Mixtures", Carbon, 35, 1545 -1557 (1997).

"Quantification Evaluation of a Real-Time Beryllium air Monitoring System Using Laser-Induced Breakdown Spectroscopy", UCRL-JC-123854, Lawrence Livermore National Laboratory, CA (1996).

"Chemical Reaction Engineering Education at Tuskegee University", Topical Conference Proceedings, AIChE Annual Meeting Los Angeles, 12-17 November 2000, R.P. Hesketh, C. S. Howat and D.S. Dixon Editors. American Institute of Chemical Engineers, New York, 2000.

"Estimation of Permeation Rate of Chemicals Through Elastometric Materials", J. Appl. Polym. Sci., 79, 1265-1272 (2001).

"Fire Suppression Efficiency of Bromoalkene/Nitrogen Gas Mixtures", Proceedings of Halon Options Technical Working Conference, April 24-26, 2001, Albuquerque, NM.

"Fire Extinguishing Ability of 1-Bromo-1 Propane and 1-Methoxynonafluorobutane Evaluated by Cup Burner Method", Journal of Fluorine Chemistry, 111, 33-40 (2001).

"Fire Protection with Bromoalkene/Nitrogen Gaseous Mixtures", Ind. Eng. Chem. Res., 40, 4649-4653 (2001).

"Theoretical study of the performance of activated carbon in the presence of binary vapor mixtures", in Activated Carbon Compendium, Harry Marsh, Editor, PP. 187-199, Elsevier, New York (2001).

"Estimation of extinguishing concentration of binary agents", Proceedings of Halon Options Technical Working Conference, April 29 – May 2, 2002, Albuquerque, NM.

"Effectiveness of new binary agents", Fire Safety Journal 38, 553-567 (2003).

"A Novel Viscometer and its Viscometer Equation Characterizing Pseudoplastic liquids", Proceedings of the 2003 American Institute of Chemical Engineers Annual Meeting, AIChE, November 16 – 21 (2003).

"Characterization of Pseudoplastic liquids with a Novel Viscometer", Proceedings of the 2003 American Institute of Chemical Engineers Annual Meeting, AIChE, November 16 – 21 (2003).

"A Self Assessment of Computer Science Education in a Chemical Engineering Curriculum", Proceedings of the 2004 American Society for Engineering Education Annual Conference and Exposition, American Society for Engineering Education, June 20 – 23, 2004.

"Rheological Characterization of Power-Law Fluids with a Novel Viscometer", Proceedings of the 2004 American Institute of Chemical Engineers Annual Meeting, AIChE, November 7 – 12 (2004).

"Replacing Figures and Tables for Engineering Design with Simple In-House Developed Computer Software", Proceedings of the 2004 American Institute of Chemical Engineers Annual Meeting, AIChE, November 7 – 12 (2004).

"Developing Simple Viscosity Experiments for High School Science Classes", Proceedings of the 2004 American Institute of Chemical Engineers Annual Meeting, AIChE, November 7 – 12 (2004).

"Incorporating Experiments on Characterizing Non-Newtonian Fluids into the Undergraduate Curriculum", Proceedings of the 2004 American Institute of Chemical Engineers Annual Meeting, AIChE, November 7 – 12 (2004).

"A Simple Viscometer Experiment for High School Science Classes", Chemical Engineering Education, 40 (3), 211 – 214 (2006).

"Rheological Characterization of Shear-Thinning Fluids with a Novel Viscosity Equation of a Tank-Tube Viscometer", Appl. Rheol. 17 (5), 51413_1 – 51413_9 (2007).

"Rheological Characterization of Non-Newtonian Fluids with a Novel Viscometer", Chemical Engineering Communications, 195 (6), 685-705 (2008).

"Carbon capture and CCS Research at Tuskegee University", Presented at the Second Annual Tuskegee Forum on Carbon Capture and Storage (CCS) Technologies, April 26, 2010, Tuskegee, AL

"Geological Sequestration Training and Research Program in Capture and Transport: Development of the Most Economical Separation Method for CO_2 Capture", Presented at the NETL/DOE Kickoff Meeting, March 22, 2010.

" Development of the Most Economical Separation Method for CO_2 Capture", Presented at the NETL/DOE Annual Meeting, February 23, 2011.

"Development of a model to screen different absorption processes for possible use for CO_2 capture" presented at the Tenth annual Carbon Capture & Sequestration Conference, May 2 – 5, 2011, Pittsburgh, PA.

"Gulf coast oil spill instruction at Tuskegee University", presented at the Annual conference of American Society of Engineering Education, Vancouver, Canada , June 26-29, 2011.

"Arsenic Removal from Water Using Bone Char". Abstract accepted in the American Water Works Association's (AWWA) Water Quality Technology Conference in Toronto, Ontario, Nov. 4-8, 2012.

" Arsenic Removal from Water Using Bone Char", Poster will be presented in the American Water Works Association's (AWWA) Water Quality Technology Conference in Toronto, Ontario, Nov. 4-8, 2012.

" Generation and Characterization of Nano-sized Bone char and Its Application for Water Treatment", Presented at 2iE-Tuskegee summer school in Burkina Faso, West Africa, June 11-21, 2012.

" Arsenic Removal from Aqueous Solution using Nano-Sized Bone Char", Presented at the Prairie View A & M University/Texas A & M University Professional Development Conference at Houston, TX, May 17-20, 2012.

"Economic evaluation of membrane separation processes for CO_2 capture", presented at the 2012 NETL CO_2 Capture Technology Meeting, July 9-12, 2012, Pittsburg, PA.

" Honeycomb monolithic catalysts for the production of biodiesel fuels from canola oil", presented at 2012 AIChE Annual Meeting, Pittsburgh, PA, October 28 – November 02, 2012.

"Zero Valent Silver-based Electrode for 2, 4-Dinitrotoluene Detection", Presented at 2013 AIChE Annual Meeting, San Francisco, CA, November 3-8, 2013.

"Economic evaluation of adsorption processes for CO_2 capture", presented at the 2013 NETL CO_2 Capture Technology Meeting, July 8-11, 2013, Pittsburg, PA.

"Fatty Acid Methyl Ester Biodiesel Fuels Produced From Soybean Oil With Honeycomb Monolithic Catalysts", Presented at 2013 AIChE Annual Meeting, San Francisco, CA, November 3-8, 2013.

"An Investigation of the Impact of Synthesis on the Vapor Pressure and Vapor Constituents of TATP", To be presented at 2014 AIChE Annual Meeting, Atlanta, GA, November 16-21, 2014.

" Novel Silver/Carbon Material for 2, 4-Dinitrotoluene Detection" presented at 2014 AIChE Annual Meeting, Atlanta, GA, November 16-21, 2014.

"An Investigation of the Impact of Synthesis on the Vapor Pressure and Vapor Constituents of TATP", presented at 2014 AIChE Annual Meeting, Atlanta, GA, November 16-21, 2014.

" Novel Silver/Carbon Material for 2, 4-Dinitrotoluene Detection" presented at 2014 AIChE Annual Meeting, Atlanta, GA, November 16-21, 2014.

"Fatty Acid Methyl Ester Biodiesel Fuels Produced from Soybean Oil with Honeycomb Monolithic Catalysts", presented at 2014 AIChE Annual Meeting, Atlanta, GA, November 16-21, 2014.

"Fatty acid methyl ester biofuels produced from canola oil with honeycomb monolithic catalysts", Fuel, 145, 116-126 (2015).

"Optimization of Fenton's oxidation conditions for removal of chrysene in aqueous solutions" presented at 2015 AIChE Annual Meeting, Seattle, WA.

"Adsorption Characteristics of Arsenic (V) from Water using Cattle Bone Char" to be presented at the Society of Environmental toxicology & Chemistry (SETAC) North America 36th Annual Meeting, Salt Lake city, UT, November 1-5, 2015.

"Synthesis and Electrochemical Characterization of Graphene-Metal and Metal Oxide Nanocomposites" presented at 2015 AIChE Annual Meeting, Seattle, WA.

"Conversion of Soybeam Oil into Biodiesel in a Monolithic Flow Reactor" presented at 2015 AIChE Annual Meeting, Seattle, WA.

"Adsorption Isotherm and Kinetic Studies of As(V) Removal from Aqueous Solution Using Cattle Bone Char" to be published in Separation Science and Technology.

"Statistical Process Monitoring for IoT-Enabled Cybermanufacturing: Opportunities and Challenges" presented at The 20th World Congress of the International Federation of Automatic Control, July 9-14, 2017, Toulouse, France