

Sanjeev Saraf, Ph.D.
Senior Associate

Professional Profile

Dr. Sanjeev Saraf is a Senior Associate in Exponent's Engineering Management Consulting practice. His primary focus is on evaluating processes/products for increased safety, reliability, and economic feasibility. Dr. Saraf holds a Ph.D. in Chemical Engineering from Texas A&M University, where he worked at the Mary Kay O'Connor Process Safety Center (MKOPSC). Prior to joining Exponent, Dr. Saraf was a partner at ioMosaic, a safety and risk management consulting firm started by former Arthur D. Little employees.

Dr. Saraf has an extensive background in safety and risk assessment of chemicals and has worked on several industrial and government projects. His areas of specialty include process safety management, consequence modeling, reactivity hazard assessment, calorimetric analysis, safety instrumented systems, relief and flare analysis, toxic plume modeling, and fires and explosions.

Dr. Saraf has performed thermal hazard testing and associated risk assessments for reactive chemicals. He has also conducted relief and flare design calculations for various clients. Dr. Saraf is proficient in analysis techniques such as Preliminary Hazards Analysis (PHA), Failure Modes and Effects Analysis (FMEA), Hazards and Operability (HAZOP) studies, Fault Tree/Event Tree Analysis, and Mean Time Between Failure (MTBF) evaluations.

Academic Credentials and Professional Honors

Ph.D., Chemical Engineering, Texas A&M University, 2003

B.S., Chemical Engineering, Mumbai University Institute of Chemical Technology, India, 1999

Publications

Saraf S. The commons: Revisiting the tragedy. *Hydrocarbon Processing* (Editorial) 2008; Jan.

Saraf S, Thomas B. Biodiesel: A feedstock quandary. *Hydrocarbon Processing* 2007; September.

Saraf S, Thomas B. Influence of feedstock and process chemistry on biodiesel quality. *Trans Instit Chem Engineer Part B* 2007; 85:360–364.

Saraf S. Risk within reason. *Hydrocarbon Processing* (Editorial) 2007; May.

Saraf S. Shipping natural gas — New frontiers. *Hydrocarbon Processing* (Editorial) 2007; January.

Saraf S, Karanjikar M. Consider open innovation. *Exploration and Production (E&P)*, HART Energy Publication, January 2007.

Saraf S, Melham GA, Ozog H. Understand LNG rapid phase transitions (RPTs). *Hydrocarbon Processing* 2007; July.

Saraf S. Web links: Appendix. *Lees Loss Prevention in Process Industries*. Third Edition, 2005.

Saraf S, Karanjikar M. Literary and economic impact of the Bhopal gas tragedy. *JLPPI* 2005; 18(4–6):274–282.

Saraf S, Mannan MS, West HH, Krishna K, Aldeeb AA, Keren N, Liu YS, Gentile M. The legacy of Bhopal: The impact over the last 20 years and future direction. *JLPPI* 2005; 18(4–6):218–224.

Saraf S, Liu YS, Ugaz VM, Rogers WJ, Mannan MS. Development of an advanced nanocalorimetry system for material characterization. *JLPPI* 2005; April.

Saraf S, Wei C, Rogers WJ, Mannan MS. Thermal runaway reaction hazards and mechanisms of hydroxylamine with acid/base contaminants. *Thermochim Acta* 2004; 421:1–9.

Saraf S, Rogers WJ, Mannan MS. Integrating molecular modeling and process safety research. *Fluid Phase Equilibria* 2004; 222–223:205–211.

Saraf S, Rogers WJ, Mannan MS. Challenges in classification of reactive chemicals. *Chem Eng Progress* 2004; 100(3):34.

Saraf S, Rogers WJ, Mannan MS, Gupta JP, Baldwin JT, Wang YJ, Krishna K. Hydroxylamine production: Will a QRA help you decide? *Reliability Engineering & System Safety* 2003; 81:215–224.

Saraf S, Rogers WJ, Mannan MS. Using screening test data to classify reactive chemicals. *J Hazard Mat* 2004; 104(1–3):255–267.

Saraf S, Rogers WJ, Mannan MS. Application of transition state theory for thermal stability prediction. *I & EC Res* 2003; 42:1341.

Saraf S, Rogers WJ, Mannan MS, Hall MB, Thomson LM. Theoretical thermochemistry: *Ab initio* heat of formation for hydroxylamine. *J Phys Chem* 2003; 107(8).

Saraf S, Rogers WJ, Mannan MS. Prediction of reactive hazards based on molecular structure. *J Hazard Mat* 2003; 98(1–3):15–29.

Presentations and Published Abstracts

Liu Y-S, Saraf SR. Emerging biochemicals market. Cleantech 2008 Conference, Boston, MA, June 1–5, 2008.

Liu Y-S, Mora S, Saraf SR, Zappi ME. Recent advances in biofuels production and by-product utilization. 30th Symposium on Biotechnology for Fuels and Chemicals, New Orleans, LA, May 4–7, 2008.

Liu Y-S, Saraf SR, Zappi ME. Current trends and future of biofuels and biomass-derived chemicals. AIChE 2008 Spring National Meeting, New Orleans, LA, April 6–10, 2008.

Saraf S, Mueller D. IGCC: CO₂ sequestration and utilization technologies. North American Advancement of IGCC, CTL, and SNG Workshop, Houston, TX, May 24, 2007.

Saraf S, Thomas B. Biodiesel: Current trends and opportunities. Invited Speaker, South Texas Section of American Institute of Chemical Engineers (AIChE), Houston, TX, May 3, 2007.

Saraf S, Medhekar S. Challenges in SIL verification. World Conference on Safety of Oil and Gas Industry (WCOGI), Gyeonggido, Korea, April 11–13, 2007.

Saraf S. Overpressure from LNG rapid phase transitions. Invited Speaker, Aker Kvaerner, Houston, TX, June 7, 2006.

Saraf S. LNG characteristics and properties—Rapid phase transition issues. Invited Speaker, Industrial Fire World LNG Symposium, Baton Rouge, LA, March 30–31, 2006.

Saraf S, Melhem GA. SuperChems reactivity expert system for screening chemical reactivity hazards. Third International Symposium on Runaway Reactions, Pressure Relief Design, and Effluent Handling, Cincinnati, OH, November 1–3, 2005.

Saraf S, Melhem GA, Ozog H, Kalelkar A. Can LNG explode? Working Together: R&D Partnerships in Homeland Security, Boston, MA, April 27–28, 2005.

Saraf S, Melhem GA. Modeling LNG pool spreading and vaporization. AIChE Spring Meeting, Atlanta, GA, April 10–14, 2005.

Saraf S, Liu YS, Ugaz VM, Rogers WJ, Mannan MS. Rapid reactivity screening using a nanocalorimeter. AIChE Spring Meeting, Atlanta, GA, April 10–14, 2005.

Saraf S, Karanjikar MK. Literary and economic impact of the Bhopal gas tragedy. Conference on the 20th Anniversary of the Bhopal Gas Tragedy, Indian Institute of Technology, Kanpur, India, December 1–3, 2004.

Saraf S, Liu YS, Ugaz VM, Rogers WJ, Mannan MS. The legacy of Bhopal: The impact over the last 20 years and future direction. International Conference on the 20th Anniversary of the Bhopal Gas Tragedy, Indian Institute of Technology, Kanpur, India, December 1–3, 2004.

Saraf S, Liu YS, Ugaz VM, Rogers WJ, Mannan MS. Fabrication of a novel calorimeter to characterize nano-scaled materials. Annual AIChE Meeting, Austin, TX, November 7–12, 2004.

Saraf S, Aldeeb AA, Rogers WJ, Mannan MS. Computational tools to predict heats of reaction and activation energy for reactivity hazards evaluation. Annual AIChE Meeting, Austin, TX, November 7–12, 2004.

Saraf S, Liu YS, Rogers WJ, Ugaz VM, Mannan MS. Development of a nanocalorimeter for material characterization. 32nd Annual Conference of the North American Thermal Analysis Society (NATAS), Williamsburg, VA, October 4–6, 2004.

Saraf S, Rogers WJ, Mannan MS. Predicting properties of energetic materials via molecular modeling. Annual AIChE meeting, San Francisco, CA, November 16–21, 2003.

Saraf S, Rogers WJ, Mannan MS, Chervin S, Bodman GT. Correlating explosive properties to DSC parameters. 31st Annual Conference of the North American Thermal Analysis Society (NATAS), Albuquerque, NM, September 22–24, 2003.

Saraf S, Rogers WJ, Mannan MS. Integrating molecular modeling and process safety research. 15th Symposium on Thermophysical Properties, NIST, Boulder, CO, June 22–27, 2003.

Saraf S, Rogers WJ, Mannan MS. Challenges in classification of reactive chemicals. AIChE Spring National Meeting, New Orleans, LA, March 30–April 3, 2003.

Saraf S, Rogers WJ, Mannan MS, Gupta JP, Baldwin JT, Wang YJ, Krishna K. Hydroxylamine production: Will a QRA help you decide?" CHEMCON 2002, 55th Annual Session of Indian Institute of Chemical Engineers, December 2002.

Saraf S, Rogers WJ, Mannan MS, Margl PM, Frurip DJ, Chervin S, Bodman GT. Calorimetric data correlations with molecular descriptors. Annual AIChE Meeting, Indianapolis, IN, November 3–8, 2002.

Saraf S, Rogers WJ, Mannan MS. Using screening test data to classify reactive chemicals. Mary Kay O'Connor Process Safety Center Symposium, October 2002.

Saraf S, Rogers WJ, Mannan MS. Predictive techniques for reactive chemicals hazard evaluation. 30th Annual Conference of the North American Thermal Analysis Society, September 2002.

Saraf S, Rogers WJ, Mannan MS, Thomson LM. Density functional investigation of hydroxylamine decomposition. Annual AIChE Meeting, Reno, NV, November 2001.

Saraf S, Rogers WJ, Mannan MS. Structure-based prediction of reactive hazards. Mary Kay O'Connor Process Safety Center Symposium, October 2001.

Saraf S, Mannan MS, Rogers WJ, Aldeeb AA, Cisneros LO. Assessing potential hazards of reactive chemicals. 29th Annual Conference of the North American Thermal Analysis Society, September 2001.

Saraf S, Rogers WJ, Mannan MS. Engineering application of *ab initio* principles. Mary Kay O'Connor Process Safety Center Symposium, October 2000.

Reports

Saraf S, Medhekar SR. Building Site Assessment (BSA) for GS Caltex No. 3 HOU Permanent and Temporary Buildings. Prepared for GS E&C, Seoul, September 2008.

Saraf S, Medhekar SR. Quantitative Risk Assessment (QRA) for GS Caltex No. 3 HOU Project. Prepared for GS E&C, Seoul, October 2008.

Saraf S, Medhekar SR. Quantitative Risk Assessment (QRA) for GS Caltex No. 2 HOU Project. Prepared for GS E&C, Seoul, November 2008.

Saraf S, Medhekar SR, Reza A, Dillon S, Lieberman D. BP Whiting Refinery—RGP/PGP storage area gap analysis. Prepared for BP Products America Inc., Whiting Business Unit, Exponent Failure Analysis Associates, Inc., November 30, 2007.

Saraf S, Medhekar SR. Quantitative Risk Assessment for Daelim/KOC project—Replacement of crude oil filling lines. Prepared for Daelim Industrial Co., Ltd., Exponent Failure Analysis Associates, Inc., February 2008.

Saraf S, Medhekar SR. VRAD LiMP battery risk analysis. Prepared for AT&T Services, Inc., Exponent Failure Analysis Associates, Inc., July 6, 2007.

Saraf S, Medhekar SR. SIL verification study for new ethane recovery plant at KNPC's MAA refinery. Prepared for New Ethane Recovery Plant Project, Hyundai Engineering & Construction Co., Ltd., Exponent Failure Analysis Associates, Inc., December 13, 2006.

Peer Reviewer

- Process Safety Progress
- Journal of Loss Prevention in the Process Industries—JLPPI
- Journal of Petroleum Science & Engineering—JPSE
- Process Safety and Environmental Protection – European Federation of Chemical Engineering: Part B

Session Chair

- Effluent Handling Design for Reactive Systems at the AIChE Annual meeting in Cincinnati, OH, November 2005
- Reactive Chemicals session at the International Conference on the 20th Anniversary of Bhopal, Kanpur, India, December 2004
- Biodiesel and Renewable Fuels, AIChE Spring meeting, Houston, TX, April 2007
- Recent Advances in LNG, AIChE Spring meeting, Houston, TX, April 2007
- Site Management: Preparing for Natural Disasters and Lessons Learned, AIChE Management Division, New Orleans, AIChE 2008 Spring National Meeting, New Orleans, LA, April 6–10, 2008
- “Hazard Identification and Risk Assessment Tools,” 10th Process Plant Safety Symposium, Part of the 4th Global Congress on Process Safety, AIChE 2008 Spring National Meeting, New Orleans, LA, April 6–10, 2008

Professional Affiliations

- American Institute of Chemical Engineers—AIChE
- American Chemical Society—ACS
- North American Thermal Analysis Society—NATAS
- MIT Enterprise Forum of Texas