MINNESOTA CHROMATOGRAPHY FORUM

Concepts in Sustainability and Green Chemistry

by Doug Raynie

This short course is designed to provide participants with an understanding of the principles of sustainability and green chemistry. Upon successful completion of the course, the participant will have an understanding of the principles of green chemistry, the principles of green engineering, and resources to further their understanding of green chemistry. The course will begin by discussing principles of green chemistry and engineering as a supporting pillar of sustainable development. Case studies will be presented to exemplify each of these green chemistry principles. Finally, green chemistry education and resources will be presented. Throughout the course both principles and practical aspects of the outlined topics will be presented.

Course Topics

I. Introduction
   a. What is sustainability
   b. The Business Case for Sustainabiity
II. Trends and Drivers
III. Supply Chain and Sustainable Design
   a. Design Considerations
   b. REACH, TSCA, and Other Programs
   c. Cradle-to-Cradle Design
IV. Biomimicry
V. Industrial Ecology
VI. Life-Cycle Assessment
   a. Eco-Efficiency Analysis
VII. Renewable Resources
VIII. Green Chemistry
   a. Introduction
   b. 12 Principles
   c. Case Studies
   d. Toxicology
   e. Safer Solvents
IX. Green Analytical Chemistry
X. Metrics for Assessing Greenness
XI. Green Chemistry Education
XII. Green Chemistry Resources

Dr. Douglas Raynie is a Research Associate Professor in the Department of Chemistry and Biochemistry at South Dakota State University. Prior to joining SDSU, he was employed for eleven years as a Senior Scientist at Procter and Gamble's Corporate Research Division. He earned his Ph.D. at Brigham Young University under the direction of Dr. Milton L. Lee. His undergraduate degree is from Augustana (South Dakota) College, with majors in chemistry and biology. Dr. Raynie's research interests include high-resolution chromatography (including high-temperature LC and SFC), chromatographic sample preparation (including ASE, SFE, SPME, and SPE), chromatography theory, green chemistry, and problem-based learning in analytical chemistry. Dr. Raynie has several publications and presentations related to these fields, has taught about 50 short courses covering extraction methodology and analytical problem-solving, and serves on the editorial advisory boards of *Pharmaceutical Formulation and Quality* and the *Encyclopedia of Separation Science*. Doug was a founder and past-president of the Tri-State Supercritical Fluids Discussion Group. He is a member of the American Chemical Society (Division of Analytical Chemistry, Subdivision on Chromatography and Division of Industrial and Engineering Chemistry, Subdivision on Green Chemistry and Engineering), and the International Society for the Advancement of Supercritical Fluids.