



# Rocky Mountain AICHE News

September 2005

Volume 15 Number 1

## September Section Meeting: Loss of Odor Through Conjugation, Suppression and Cross-Adaptation: How One Plus One Can Sometimes Equal Zero

When the average person thinks of the kind of work that a chemist might do, they almost always envision someone in a lab coat blowing things up or making bad smells. I have been fortunate in my career; I've gotten to do both!

Since 1988, I have been active in the science and technology of fuel gas odor. Odorization (for safety reasons) has been going on since 1942, but difficulties persist. A well known but often poorly understood problem is the phenomenon of odor fading, the gradual diminution of the odor added to fuel gas. Some of the more obvious causes of fading are fairly well understood, such as adsorption, partitioning (or absorption), and chemical reactions (oxidation). Our work at NIST has included the measurement and modeling of the diffusion of odorants in fuel gases, and the measurement and modeling of adsorption of odorants on surfaces. These are stories for another day. Today, we will discuss some of the fascinating yet obscure mechanisms related to the olfaction process itself, a topic that is timely given the 2004 Nobel Prizes in Medicine.

Odor suppression (sometimes called masking), conjugation and cross-adaptation are among a collection of such phenomena that may contribute to

### September Section Meeting

**Topic:** Loss of Odor Through Conjugation, Suppression and Cross-Adaptation: How One Plus One Can Sometimes Equal Zero

**Speaker:** Dr. Thomas J. Bruno  
Project Leader, Physical & Chemical Properties Division of the National Institute of Standards & Technology

**Date:** Tuesday, September 20th

**Time:** 6:00 Social Hour  
6:30 Dinner  
7:15 Presentation

**Location:** Xcel Energy Meeting Room  
4653 Table Mountain Dr., Golden

**Menu:** Boston Chicken Dinner

**Cost:** Members: \$20  
Non-Members: \$25  
Students & Unemployed: \$10

Please RSVP by **Friday, September 16<sup>th</sup>** (early RSVPs are greatly appreciated!). Indicate your name, phone number, and number of attendees by e-mailing Tom Wellborn at [rockyaiche@yahoo.com](mailto:rockyaiche@yahoo.com).

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or cause fading, but these effects remain enigmatic. They are related to the differential effects that one odorant species will have when mixed with another. Masking describes situations in which one odorant can overpower the sensation of another. Conjugation describes the situation in which two odoriferous compounds, when sniffed together, produce the sensation of very little odor, or no odor at all. Cross adaptation is the desensitization effect produced by one odoriferous compound on another. In this talk, I will describe some of the history of fuel gas odorization, and the basics of olfaction. I will then move on to masking, conjugation and cross adaptation, and discuss how these phenomena might be part of the odorant fading puzzle.

Thomas J. Bruno, Ph.D., is a project leader in the Physical and Chemical Properties Division at the National Institute of Standards and Technology, Boulder, Colorado. Dr. Bruno received his B.S. in chemistry from the Polytechnic Institute of Brooklyn (1976), and his M.S. and Ph.D. in physical chemistry from Georgetown University (1978, 1981). He served as a National Academy of Sciences-National Research Council postdoctoral associate at NIST, and was later appointed to the staff.

Dr. Bruno has done research on properties of fuel mixtures, explosives, reacting fluids, and environmental pollutants. He is also involved in research on supercritical fluid extraction and chromatography of bioproducts, the development of novel analytical methods for environmental contaminants, novel detection devices for chromatography, and he manages the division analytical chemistry laboratory.

In his research areas, he has published approximately 120 research papers, 7 books, and has been awarded 10 patents. One of his books, Handbook of Basic Tables for Chemical Analysis, is the 5th best selling book in analytical chemistry. This book is now in its second edition.

He was awarded the Department of Commerce Bronze Medal in 1986 for his work on the thermophysics of reacting fluids.

He has served as a forensic consultant and/or an expert witness for the U.S. Department of Justice (notably during the federal trial of Terry Nichols for the Oklahoma City bombing), various United States Attorney's offices, and various offices of the U.S. Inspector General. He received a letter of commendation from Department of Justice for these efforts in 2002.

## Sales & Application Engineer Wanted

Applied Flow Technology, a leading developer of pipe flow modeling software in Woodland Park, CO, has an opening for a Sales & Applications Engineer. Duties include a wide variety of responsibilities in technical support and sales including; customer support on company products, responding to sales inquiries, processing orders and assisting in production of order materials, maintenance of contact management database and providing consulting services. Qualifications: B.S. in Mechanical or Chemical Engineering with 2 year minimum experience and knowledge of piping/pumping systems. Additional information may be found at [www.aft.com/company/employment.php](http://www.aft.com/company/employment.php). Resumes may be sent to P.O. Box 6358, Woodland Park, CO 80866, or by fax to 719-686-1001 or email to [info@aft.com](mailto:info@aft.com).

### NEW MEXICO CORNER

New Mexico members are getting active and organized. Kerri is searching for volunteers to speak/present an engineering topic, so please contact her if you know of anyone available in the Albuquerque area. For more information about the New Mexico meetings, contact Kerri Pratt at [PrattKL@cdm.com](mailto:PrattKL@cdm.com)

## *AIChE Meetings*

### **2005**

- Sept 11-14 LNG Conference  
Vancouver, BC
- Sept 26-29 Safety in  
Ammonia Plants  
Toronto, Ontario
- Oct 30-Nov 4 2005 Annual Mtg.  
Cincinnati, OH
- Nov 2-4 AIChE/ACS Mgmt  
Cincinnati, OH
- ### **2006**
- Apr 23-27 2006 Spring Nat'l  
Orlando, FL
- June Process Develop.  
Symposium  
Palm Springs, CA
- Nov 12-17 2006 Annual Mtg.  
San Francisco, CA

For further information, contact  
National AIChE.

### **National AIChE Contact Info**

#### **AIChExpress Service Center:**

(US/Canada): 1-800-AIChEmE  
(1-800-242-4363)

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Fax: 212/591-8888

E-mail: [xpress@aiiche.org](mailto:xpress@aiiche.org)

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**Govt. Relations Fax:** 202/962-8699

**Web Page:** <http://www.aiiche.org>

## *Rocky Mountain AIChE Officers*

- Glenn Sprenger Director & Membership 720/873-4756  
[Gsprenger@allosource.org](mailto:Gsprenger@allosource.org)
- Kevin Milliman Chair 303/804-2374  
[Kevin.Milliman@earthtech.com](mailto:Kevin.Milliman@earthtech.com)
- Tom Wellborn Vice-Chair / Program 303/933-0533  
[wellborns@mindspring.com](mailto:wellborns@mindspring.com)
- Curtis Dominicak Secretary 303/969-9416  
[Cldominicak@comcast.net](mailto:Cldominicak@comcast.net)
- Craig Wildemuth Treasurer 303/791-6307  
[Craig.Wildemuth@grace.com](mailto:Craig.Wildemuth@grace.com)
- Martin Vorum Employment Info 303/789-0848  
[Mvorum@chisp.net](mailto:Mvorum@chisp.net)
- Collin Greenwell Student Chptr. Liaison 720/497-2133  
[Collin.greenwell@xcelenergy.com](mailto:Collin.greenwell@xcelenergy.com)
- Kerrie Pratt New Mexico Liaison 505/243-3200  
[PrattKL@cdm.com](mailto:PrattKL@cdm.com)
- Laura Moes Editor 303/770-2432  
[Lauramoes@msn.com](mailto:Lauramoes@msn.com)

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The objectives of AIChE are to advance chemical engineering in theory and practice, to maintain a high professional standard among its members, and to serve society, particularly where chemical, engineering can contribute to the public interest.

## ***UPCOMING MEETINGS***

*Rocky Mountain District of AIChE meets the third Tuesday of every month*

*October 18: Tour of Dyno-Nobel Ammonia Plant in Cheyenne*

*November 15: Tour of BP/CU Visualization Center in Boulder*

*December: No meeting*

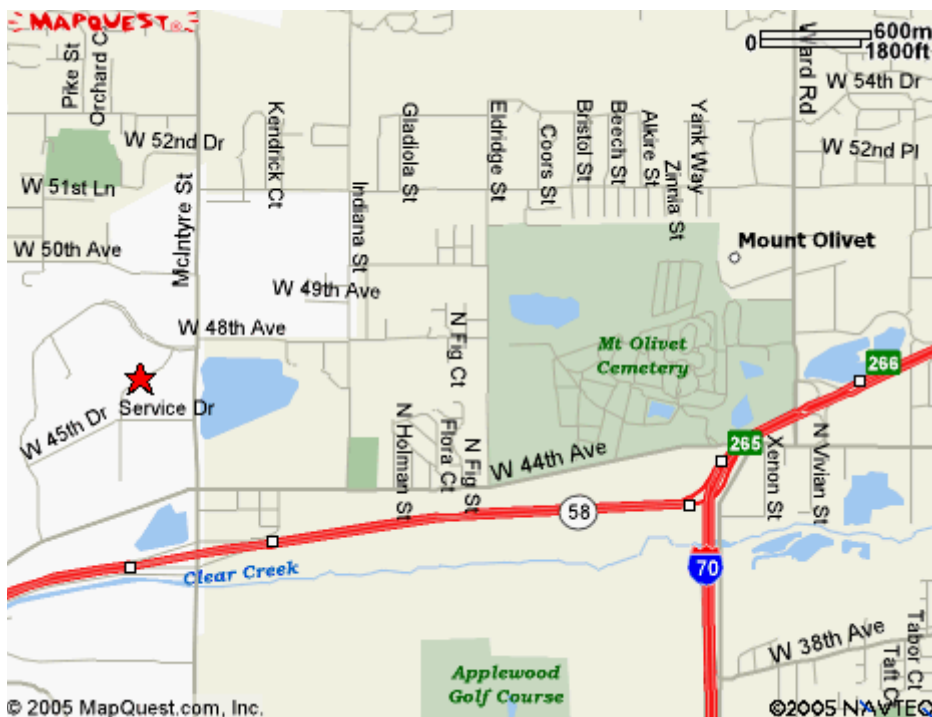
*January 17, 2006: Nanoproducts*

Rocky Mountain AIChE News  
America Institute of Chemical Engineers  
7900 S. Monaco Ct.  
Centennial, CO 80112-1326

On the Web at:

<http://www.aiche-rm.org>

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[mmoes@ekiconsult.com](mailto:mmoes@ekiconsult.com) to receive  
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**DIRECTIONS:** From I-70, take the West 44<sup>th</sup> avenue exit (#266) toward CO-72/Ward Road (traveling west). Turn RIGHT (north) onto McIntyre Street. Cross over the railroad tracks and turn LEFT (west) onto Service Drive into the Coors Technology Center. Proceed to the stop sign and turn RIGHT (north) onto Table Mountain Drive. The Xcel Energy Building is the first entrance on the left. Park in the front lot and sign in at the front desk.