

Obituary

Thomas Charles Hofelich, PhD



It is with great sadness that we report the death of Tom Hofelich at the age of 52 years on March 11th, 2006, from complications due to brain cancer. He was a great intellect, respected colleague, and passionate human being well-known for his experimental and theoretical advances in calorimetry, thermal analysis, and reactive chemicals/hazard evaluation. Tom brought to our technical community his deep understanding of the fundamentals of thermochemistry; particularly kinetics. He made difficult experiments and analysis of data transparent to others. He also made thermokinetic models that were essential to the rapid and careful integration of the data and translation into knowledge that facilitated good decision-making. Much of the technology that Tom developed in microcalorimetry and thermal hazard evaluation is also used by the international thermal analytical community.

Tom was born in Troy, NY. He graduated with a B.Sc. in Chemistry with Distinction from Clarkson University in Potsdam, NY, in 1975. There, in classes with Petr Zuman, he discovered that he had a passion for chemical kinetics and reaction mechanisms. He moved to the State University of New York in Buffalo, NY, to work with Calvin Ritchie in solvent and structural effects on rates and equilibria of organic reactions. Tom

completed his Ph.D. in Physical Organic Chemistry in 1980. His graduate research involved the use of fast kinetic techniques to study organic reactive intermediates summarized in his doctoral thesis entitled “Reactions of Nucleophiles with an Ion-pair”. From 1980 to 1982, Tom was a post-doctoral fellow at Duke University with E.M. Arnett. His research involved the development of novel calorimetric methods to study organic reactive intermediates at low temperatures. He studied carbocations in superacid media; the proof of this intermediate led to its incorporation in modern organic text books. He also supervised undergraduate researchers involved in quantitation of Lewis acidity.

Tom began his career at The Dow Chemical Company in 1982 working on assignments in the Chemical Processes Laboratory. In 1983, he joined the Dow Analytical Laboratory in the Thermal Analysis group and spent the rest of his career there as a contributing member and technical leader. Initially, he focused on ways to effectively use microcalorimetric techniques to solve problems in a broad range of products and processes. He creatively designed experiments and developed approaches appropriate for the scenario and the physical nature of the system (mixing, heat transfer, scale, etc.). For example, he developed simple rules for applying DSC data which led to an approach relating the type and sensitivity of calorimeters to the scale of the process being studied. This he presented in simple graphical format. He also developed a broad range of microcalorimetric techniques to characterize reactive systems in the assessment of runaway reaction hazards, including the development and commercialization of the Two Drop Calorimeter. This was a small-scale and quantitative technique to quickly screen heats of mixing to evaluate the safe mixing of chemicals. Tom also developed many techniques related to the evaluation of process streams and mixtures beyond pure compounds. Making sure that he had representative samples of process streams was very important to Tom, and he went to great lengths to establish good methods for sampling.

As Tom began to tackle larger-scale problems, he found creative ways to provide mixing in his calorimetric systems. He also effectively adapted and developed mathematical modeling techniques so that the small-scale calorimetric thermokinetic data could be applied to very large physical systems. He participated in generating heat transfer data on large processing, storage and transportation equipment, so that more accurate process models

could be developed and used to simulate safe process operation. One story he enjoyed telling was how he “borrowed” a railcar, filled it with hot water, and measured temperature as a function of time to derive its heat transfer coefficient. Tom developed very complicated models using “heat gains” and “heat loss” data, and then presented these models in an elegant, simple way. In the spirit of continuous learning, he studied process engineering technology in order to complete these projects.

In the mid-to-late 1990s, Tom pioneered the application of calorimetric methods, especially open-cup ARC, with thermokinetic and Frank-Kamenetskii modeling to quantify thermal and/or oxidative runaways in solids. Applications include carbon beds, insulation, absorbents, extruder patties, etc. As a computational “super-user” in Analytical Sciences, he developed spreadsheets and later brought CISP software to bear on projects; the latter with Arcady Kossoy described in “Methodology and Software for Assessing Reactivity Ratings of Chemical Systems” (2003). Tom also worked on high throughput calorimetry, and came up with the concept for the Array Calorimeter described in his paper “A Large Array Calorimeter for Support of Combinatorial Research”, 56th Calorimetry Conference, Colorado Springs (2001). He also made significant contributions to research and projects in biocalorimetry and product service-life prediction.

A key strength was Tom’s passion for public speaking and teaching. He gave over 24 lectures/presentations over his 24 year career. He presented “Applications of Calorimetry in Industrial Problem Solving” as an invited speaker to the Arthur and Dorothy Sigel Spring Lecture Series at Michigan Technological University Department of Chemical Engineering (2000). He mentored and encouraged many students during his career, many of whom were inspired to pursue advanced degrees in graduate programs. His former group leader, Bruce Powers, reflects “All this technology would have been wonderful, but in isolation would have had little impact. Tom was a wonderful teacher and leveraged his newly developed technologies into the hands of many other chemists. It is in the hands of these chemists and engineers that this technology will become a lasting legacy to Tom”.

He authored two US patents and co-authored numerous Dow Research Reports and external publications. On the use of calorimetry in Reactive Chemicals evaluation, these papers addressed a wide-range of topics including: the use and misuse of detected onset temperatures, chemical compatibility, NFPA reactivity hazard rating parameters, carbon bed fire prevention, and heats of mixing. In recognition for his innovations in Calorimetry, he was awarded the Christensen Memorial Award at the 50th Annual Calorimetry Conference. For significant contributions in Process Safety, he received the Bill Doyle Award at the Loss Prevention Symposium of the AIChE meeting in Atlanta, GA in 1994. Some of his other professional awards include the Vernon A. Stenger Analytical Sciences Award, Dow R&D Michigan Scientists Award, Dow R&D Analytical Sciences Team Work Award, and numerous P.A. Traylor Creativity Awards.

Professional memberships include ASTM E-27 Committee on Thermal Stability of Chemicals (Secretary), American Chemical Society, Sigma Xi, American Society for Testing and Materials, and the Calorimetry Conference.

Preserved on Tom’s web site is a detailed technical and personal description, including data and models, of his battle with cancer (http://www.tchofelich.org/2005_lymphoma_updates.htm). When diagnosed in January of 2005 with metastatic testicular lymphoma to the brain, over a hundred friends and co-workers continuously provided him with “Friday funnies”, visits, thoughts and prayers. His inspiration also came from his personal hero, Stephen Jay Gould, who used statistics to defeat the pessimism of “median survival rates” in his excerpt entitled “The Median Isn’t the Message”. With his faithful wife by his side, Tom fought with humor and a positive attitude, with a strong will and purpose for living, with a commitment to struggle, and with an active response to aiding his own treatment. They purchased a pH meter and measured/plotted urine pH with every void to prevent an appreciable amount of the insoluble methotrexate, a chemo agent and weak organic acid ($pK_a \sim 4.8\text{--}5.5$), from precipitating in his kidneys and causing renal failure. The need for accurate data and the theory behind this proposed methodology was communicated to the hospital and staff to educate and to help others.

Tom had a natural curiosity that led him to be a great scientist with the ability to take off-the-wall creative ideas and turn them into practical applications that were used to solve many problems—from product stability to fires in industrial settings. Another remarkable attribute of Tom was his dedication to his research, his Dow client-partners, and to his role on the Thermal Leadership Team during cancer treatments and recovery. While undergoing bi-weekly high-dose chemotherapy in the hospital, he applied technology to remotely “attend” meetings, to run calorimeters over the network from home, and to model data via BluetoothTM, his cell phone, his Dow laptop, and webcams.

In the course of his career, Tom made many significant contributions to science and his profession. His broad interests, high level of energy, and tireless creativity stimulated the people he worked with and resulted in broader uses for calorimetry in the use of reactive chemicals and the safe operation of chemical processes. To many of us he was a friend, a teacher, and a caring human being. To others, he was a strong mentor. We were blessed by knowing him, by having the opportunity of working with him, of feeling his passion for science, education, and technology, his passion for everything and counting him as a student, a teacher and a friend. In short, he was our partner. His legacy have a deep understanding of your technology, a passion for life, and share these with others. We are better because he journeyed with us. He made a difference.

Acknowledgments

We wish to thank Lee Hansen, a dear friend and colleague whom Tom admired and respected, for recommending this article for *Thermochimica Acta*. We also thank our management in this technical arena for their support in publishing this article, especially David Summers, Kevin Hool, Judy Gunderson, and Patrick Murphy. Many thanks to Tom’s friends and co-workers; he truly enjoyed and appreciated all projects and interactions—technical and personal. We especially wish

to acknowledge and thank The Dow Chemical Company on Tom's behalf for its commitment, resources, and support; especially while fighting cancer. Dow gave Tom the perfect job; an opportunity to lead, to practice and to preach what he loved until the day he died. His death is mourned by his beloved wife, Marabeth, his partner in Dow's global Thermal/Reactive Chemicals community; and by their children and step-children, Alicia and Marty Hofelich, and Russell and Lauren LaBarge; and by his family, friends, and colleagues.

Chris Christenson
Tim Elwell
Marabeth Hofelich*

Harold Johnstone
Hank Kohlbrand
Bruce Powers
Brenda Prine
Kenan Stevick
Larry Whiting

*The Dow chemical company,
1897 Bldg., Midland, MI 48667,
United States*

* Tel.: +1 989 636 2642.

E-mail address: mshofelich@dow.com

(M. Hofelich)

Available online 17 June 2006