



*Joe M Smith*

## JOE MAUK SMITH

1916–2009

Elected in 1975

*“For leadership in chemical reaction kinetics and thermodynamics and teaching of these subjects.”*

BY ALAN JACKMAN AND BEN MCCOY  
SUBMITTED BY THE NAE HOME SECRETARY

**J**OE M. SMITH, professor of chemical engineering emeritus at the University of California, Davis, died at his home in Davis on June 7, 2009, at the age of 93. He was among a handful of educators who truly blazed new trails for chemical engineering in the 20th century. His groundbreaking textbooks on thermodynamics and kinetics have had profound influences.

Joe was born in Sterling, Colorado, on February 14, 1916. His family moved to Long Beach, California, when he was very young, and he was educated in the Long Beach public schools. At Long Beach Polytechnic High School, influenced by two outstanding teachers, he excelled at math and chemistry. Neither of his parents had a college education but his mother, in particular, was eager for Joe to attend college. When he was admitted to the California Institute of Technology (Caltech), his parents moved to Pasadena so that he could live at home and afford to attend college.

The decision to major in chemical engineering was the result of a process of elimination. Joe was not interested in mechanical drawing, civil engineering, or physics, but he loved chemistry and mathematics. So in his junior year he declared a major in applied chemistry, the name that Caltech used for its undergraduate chemical engineering program in those days, although it already offered graduate degrees in chemical engineering. Joe remembered the Caltech program

as having been difficult. All chemical engineering classes were taught by either B. H. Sage or W. N. Lacey. They were the entire Caltech chemical engineering faculty at the time. Joe said that Lacey had a particularly strong influence on his career. It was Lacey who first introduced him to thermodynamics. He was also influenced by Lacey's Socratic teaching style, a style that Joe used for much of his career. He graduated in 1937 with a bachelor of science degree in applied chemistry.

Joe then took a job with the Texas Company (later Texaco and now Chevron) in its design department on the 21st floor of the Chrysler Building in New York. There, among other projects, he worked on the design of a "stabilizer" to remove low molecular weight hydrocarbons from a gasoline fraction. He was eager to return to California and moved to the Natural Gasoline Department of Standard Oil of California (later Chevron) in Santa Fe Springs. While there he worked on distillation and absorption to remove other hydrocarbon gases from methane. He spent about two years there before moving to Chevron's El Segundo refinery, where he worked on thermal cracking.

At this time, with almost four years of industrial experience, Joe found himself wanting more challenges and he decided to return to school. It was February 1941, and the United States was contemplating entering World War II. Some of his colleagues questioned his sanity for leaving a safe, deferred job to return to school and possible military service. Nevertheless, he headed off for doctoral studies at the Massachusetts Institute of Technology, the only school to which he applied. Fortunately, MIT wrote a note to his draft board and he received a deferment.

There were fewer graduate students during the war years and MIT followed a shortened academic calendar, so things moved very fast. Joe supported himself his first semester, after which he received a fellowship and a teaching assistantship. At the time, students sometimes had little choice on thesis projects. In Joe's case he was asked by W. K. Lewis to work on a project funded by the Chemical Warfare Service to study adsorption in gas masks, which became his thesis work.

Joe completed his dissertation in 1943 and accepted a position as an assistant professor at the University of Maryland. It was there that he met and married Essie McCutcheon. During his first year of teaching, a position opened at Purdue University. Joe was attracted to Purdue by the opportunity to develop a teaching program in chemical engineering thermodynamics. He had taken advanced thermodynamics courses at Caltech from Sage and at MIT from J. A. Beattie (of the Beattie-Bridgeman equation of state) and was excited by the opportunity. So he moved to Purdue University in 1945. In developing a new course in thermodynamics for undergraduate chemical engineers, he discovered that there was no appropriate textbook for undergraduate chemical engineers and started writing *Introduction to Chemical Engineering Thermodynamics* (New York: McGraw-Hill, 1949).

Joe spent 12 years at Purdue University, and he fondly recalled this period as the most satisfying years of his teaching career. It was during those years that he developed his teaching style and an interest in reaction kinetics and reactor design that would remain the focus of his research for the rest of his career. He wrote another text, *Chemical Engineering Kinetics* (New York: McGraw-Hill, 1956).

By 1957, Joe had become well known and was sought for various positions. He decided that it might be interesting to try his hand at administration, and so he accepted a position as dean of technology at the University of New Hampshire. He quickly realized that the role of a dean did not suit him well. After a year in that post, he decided to move on. He accepted a position as chair of chemical engineering at Northwestern University, moving there in 1958. This was a period of rapid change and Joe hired several new faculty members who would profoundly change chemical engineering at Northwestern.

In August 1961, eager to return to California, Joe accepted an offer from the University of California, Davis, to help found a college of engineering. Because such a college did not yet exist, Joe started his UC Davis career as a member of the Food Science and Technology Faculty in the College of Agriculture. In 1962 the regents authorized the College of Engineering, and

Joe's appointment shifted to the new College of Engineering almost transparently. He became the founding chair of the Department of Chemical Engineering and remained at UC Davis until he reached UC's mandatory retirement age in 1986. He maintained an active research program long after his retirement.

Joe was one of the most influential chemical engineering educators in the history of the profession. He started his academic career near the end of World War II, a time of great change in chemical engineering. Shortly after arriving at Purdue, he started writing *Introduction to Chemical Engineering Thermodynamics*. Drafts of the text were used at Purdue until 1949, when the first edition was published. Hendrick Van Ness joined him as coauthor of the second edition, published in 1959. More than 60 years later and in its seventh edition, with third coauthor M. M. Abbott, this volume is still in use and is by far the best-selling textbook in the history of chemical engineering. While still at Purdue, Joe wrote a second textbook, *Chemical Engineering Kinetics*, which also became the seminal text in the field, significantly changing the way chemical reaction engineering is taught.

Over the years Joe won numerous awards and honors, including most of the major American Institute of Chemical Engineers awards: the R. H. Wilhelm Award in Chemical Reaction Engineering, the Warren K. Lewis Award for Chemical Engineering Education, and the William H. Walker Award for Excellence. Joe was proudest of the American Society of Engineering Education's Union Carbide Lectureship Award (1970) and his admission to the National Academy of Engineering (1975).

Joe loved teaching, and students appreciated his individualized approach to education. His teaching style was greatly influenced by one of his professors at Caltech, and many of his students are now professors and emulate his style. Joe's influential textbooks are testaments to his commitment to teaching.

Joe was very humble about his accomplishments and contributions. When asked to explain how he had become so successful, he attributed it to his many very bright and hard-working graduate and postdoctoral students who “did the real work” and to his wife, Essie McCutcheon Smith, whose flexibility allowed him the freedom to pursue his teaching and research. With respect to *Introduction to Chemical Engineering Thermodynamics*, as noted above, Joe thought that he was simply in the right place at the right time. Could it be that some people are able to define the right place and the right time?

Joe and his wife endowed the Joe and Essie Smith Chair in Chemical Engineering in 1996 at UC Davis. The chair is dedicated to the support of outstanding young faculty members.

Joe is survived by his two daughters, Rebecca Conrad and Marsha Torbert; six grandchildren; one great-grandchild; and an untold number of academic children and grandchildren.