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Ernest W. Thiele

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1895-1993

Written by James P. Kohn

Submitted by the NAE Home Secretary

On November 29, 1993, only nine days short of his ninety-eighth birthday, Ernest W. Thiele died in Presbyterian Nursing Home in Evanston, Illinois. His longest professional work experiences were with the Standard Oil Company of Indiana and the University of Notre Dame. He retired as associate director of research at Standard Oil (now the Amoco Corporation) in 1960 after thirty-five years there and then served as a visiting professor of chemical engineering at Notre Dame until 1970. His name was known to every chemical engineer trained after 1927, since by then all departments of chemical engineering were teaching the McCabe-Thiele method for determining distillation parameters. After 1939, most chemical engineers interested in designing chemical reactors employing solid catalysts became familiar with the Thiele modulus and catalyst effectiveness factors, which were inventions of Thiele.

Ernest Thiele was born on December 8, 1895, in Chicago, Illinois. He earned an A.B. degree from Loyola University (Chicago) in 1916. While serving briefly in the U.S. Army, he was stationed at the University of Illinois at Urbana, where he was a student of chemical engineering. He received a B.S. in chemical engineering at Illinois in 1919.

After graduation, he spent six months as a process analyst for Swift and Company in Chicago and later in Baltimore. He then was employed as a chemical engineer with Peoples Gas,

Light and Coke Company in Chicago from 1920 to 1922. In the fall of 1922 he started graduate study in chemical engineering under Professor R. T. Haslam at Massachusetts Institute of Technology (MIT). He obtained a master of science degree in 1923 and a doctor of science degree in 1925. While waiting for his doctorate readers to read his dissertation on steam-carbon reactions, he developed the idea that resulted in the McCabe-Thiele method of graphical design of fractionating columns. The paper was published in *Industrial and Engineering Chemistry (I&E Chem.)* in 1925. After leaving MIT in 1925, he joined the Standard Oil Company of Indiana as a chemical engineer. He became assistant director of research in 1935 and associate director of research in 1950. During the wartime development of atomic energy, he was on loan to the University of Chicago to work on the Manhattan Project. In 1942 and 1943 he was in charge of process design and start-up of the heavy water extraction plant at Trail, British Columbia. In 1948 he served on the Lexington Project for the evaluation of nuclear propulsion of aircraft. In 1949 he was a consultant for the Senate and House Joint Committee on Atomic Energy investigating the apparent disappearance of uranium 235 from Argonne Research Laboratories.

During his thirty-five years with Standard Oil, he displayed extraordinary creativity in development of new petroleum refining processes. He developed very efficient apparatus for distillation of hydrocarbon mixtures. His classic paper with R. L. Geddes on the methodology for stage-wise distillation computations was published in *I&E Chem.* in 1933. He was active in formulating efficient methods of solvent extraction of lubricating oils. His work on processing petroleum residual led to the development of delayed coking, which is still being used in some refineries.

As catalytic techniques began to be employed in petroleum refining, elusive problems arose in heat and mass transfer and its relation to catalyst particle size. Dr. Thiele's salient analysis led to the *I&E Chem.* paper "Relation Between Catalytic Activity and Size of Particle" in 1939. His theoretical treatment led to many patents and extensions of his theory which greatly

influenced modern catalytic processing cracking, paraffin isomerization, alkylation, and reforming. His work between 1921 and 1960 resulted in seventeen publications, twenty-seven U.S. patents, and two Canadian patents.

Thiele was a member of the Chicago Chemists Club and the American Chemical Society and was a fellow of the American Institute of Chemical Engineers. In 1966 he received the Founders Award of the American Institute of Chemical Engineers. Election to membership in the National Academy of Engineering came in 1980. The University of Notre Dame had awarded him an honorary doctorate in 1971. The Department of Chemical Engineering at Notre Dame established the Thiele Lectureship in Chemical Engineering in 1986. The lectureship is intended to recognize outstanding contributions by a younger member of the chemical engineering profession. Dr. Thiele was very pleased to be present at the first lecture, given by Professor D. Lauffenburger. A special symposium in honor of Thiele's ninetieth birthday was held in Chicago in 1985 at the annual meeting of the American Institute of Chemical Engineers. Thiele, who was in attendance, seemed as vital and mentally alert as when I first met him in 1958.

After retirement from Standard Oil, Thiele came to Notre Dame to teach. He was an energetic man who walked everywhere and spent much time in libraries. He taught four undergraduate courses a year for the ten years he was at Notre Dame. He usually taught both of the thermodynamics courses, a kinetics course, and an instrumentation course, which he turned into a course in process control and simulation. He designed and built a pressure controller, which he demonstrated in class. Every student was assigned to do a self-formulated experiment on the controller outside the class.

Thiele was a kind, gentle person who listened well to everyone whether it was in a classroom, a seminar talk, a faculty meeting, or in his office while advising a student. In fact, he was the best listener I ever met and never interrupted a speaker no matter what the occasion was. When he was finally asked to speak, he would give a short statement or suggestion which, upon inspection, was found to be invariably correct

and valuable. At our frequent department technical seminars in which invited speakers delivered their seminar talks, Thiele would always sit in the front row. The speaker, fifteen minutes into his talk, might conclude that Thiele was asleep, because he often had his eyes closed and rarely moved. However, when the talk was over and the speaker entertained questions from the audience, the last questions asked were by Thiele. Many of the speakers had trouble answering Thiele's questions intelligently because the questions were not only difficult but showed that Thiele had deeply probed into the elusive essence of any technical shortcomings of a speaker's methodology.

After ten years of teaching at Notre Dame, Thiele returned to Chicago and spent the next 27 years in the Skokie-Evanston area. He returned a few times to Notre Dame to visit those of us who had been his faculty colleagues. He always traveled by the South Shore electric train and seemed to greatly enjoy his excursions to Notre Dame.

Thiele loved traveling in Europe and went many times, often concentrating his visits in France and Germany. He wrote and spoke both French and German and felt comfortable in those two countries.

In his last three decades, he walked to the libraries of Northwestern University weekly. Occasionally, he rode the "El" to south Chicago to Crerar Library, where he would spend the greater part of a day reading technical material.

By his passing from this life, the profession of chemical engineering lost one of the premier minds in our 100-year history and a truly admirable and good person.