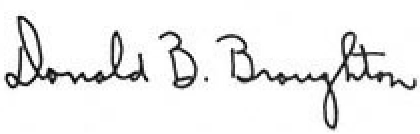
Donald B. Broughton

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1917–1984

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The amazingly rapid technical progress that has characterized the last half century is the result of many separate contributions, each of which has been essential to the overall, evolving technological pattern. Donald B. Broughton, who contributed significantly to this progress, died on December 2, 1984, after a short illness. Dr. Broughton made his most important contributions while working for Universal Oil Products, Inc. (UOP) (now a division of Signal), in the capacities of chemical engineer, senior development coordinator, manager of separation process development, and senior research and development associate, and more recently in the capacity of a consultant.

The particular areas in which Broughton did his most outstanding work are the creation and development of novel separation processes. Separation technology, although little understood or appreciated by the lay public, is vital to providing the high-purity individual components that are the necessary starting materials for producing many of the goods on which our high-technology life-styles depend. These high-purity components are normally found as complex mixtures, either naturally or in synthetic products. The separation process, therefore, is essential to make them useful intermediates for the manufacture of end products.

Dr. Broughton was born in Rugby, England, on April 20,

1917. He and his family lived in Rugby and in the neighboring town of Bolton until he was seven. They came to the United States soon after, settling in Altoona, Pennsylvania, where Broughton received most of his primary school education. Later, the family moved to Philadelphia where he attended high school. In Philadelphia his scholastic attainments earned him a chemical engineering scholarship to Pennsylvania State University.

By living frugally on his $900-a-year scholarship grant and saving his earnings from summer employment, Broughton was able to finance a year of study at the Massachusetts Institute of Technology (MIT). He received his master's degree in chemical engineering from MIT in 1940. He then spent a year working as an assistant industrial chemical engineer at Rohm and Haas but decided to return to MIT, from which he received his D.Sc. in 1943.

He remained at MIT in various teaching and research positions (with the exception of a brief period of wartime service for the Navy in Washington, D.C.) until 1949. In that year, after deciding that a period of industrial work experience would enhance his expertise as a professor, Broughton accepted a temporary position with UOP, which at that time was seeking help in organizing and updating its design methods.

In 1951 UOP found itself badly in need of a process to separate and recover high-purity benzene from the products of its newly introduced platforming process. Broughton was asked to participate in this development. The assignment proved ideal for both the company and Broughton, and after the successful creation of the Udex process, he was persuaded to continue working with UOP on the development of a variety of other separation processes. Apparently, plans to return to academic life became less attractive when compared with the challenging opportunities UOP afforded to create novel solutions for industry's many pressing, unsolved problems in the recovery of pure, individual components from mixtures.

One source of Broughton's satisfaction was undoubtedly the unique nature of UOP's business—specifically the development and licensing of new processes, particularly in the petroleum refining and industrial petrochemical fields. An organization of this type also provided daily contact with a stimulating staff that included many talented and experienced engineers and scientists together with a corporate attitude that encouraged both scientific soundness and innovative approaches. UOP also assured its staff of the wide use of successful technical accomplishments.

In developing new separation techniques, Broughton relied principally on the use of mathematical models that allowed him to apply final designs to a wide variety of applications with a high degree of confidence. He was able to create these models from a minimum of data by applying established methods of physical chemistry and thermodynamics. With their help, Broughton was able to determine optimum flow arrangements and the choice of operating parameters, as well as to identify those areas requiring additional or more precise data. Pilot plant testing was usually a final step to verify and correct the parameters in his models and to uncover any unforeseen problems.

The validity of Broughton's approach is best demonstrated by the large number and variety of separation units in operation today that are based on the designs resulting from this procedure. One of these is the Parex process, introduced in 1971, for the recovery of high-purity para-xylene from petroleum products. The process is widely used throughout the world and annually produces billions of pounds of para-xylene, which is the basic intermediate for polyester fibers. Other processes in which Broughton played a vital development role are similarly successful.

Although his methodology called for a great amount of individual effort, Donald Broughton was in no sense a loner. He thoroughly enjoyed the exchange of ideas and was always willing to listen to new suggestions. His acceptance or rejection of an idea—whether his or that of someone else—depended not on the source of the suggestion, but on whether, in his judgment, it was logical.

Broughton's pioneering accomplishments in the separations field resulted in fifty sole or joint U.S. patents and at least thirty technical articles. In 1967 he received the Alpha Chi Sigma Award for Chemical Engineering Research, sponsored by the American Institute of Chemical Engineers. He was elected a fellow of the institute in 1973. In addition to these honors, he was elected to the National Academy of Engineering in 1976 and in April 1984 received the first American Chemical Society Award in Separations Science and Technology.

No less impressive than his technical accomplishments and recognition were his personal characteristics. A well-liked, dignified, and honorable man, Donald was always available to share his knowledge, experience, and ideas with others. A natural teacher, he had the unique ability to present complex concepts in a form that could be easily understood.

Broughton became a U.S. citizen in 1936 and married in 1943; his wife Natalie survives him. He had a number of interests outside of his professional and technical activities, including classical music, chess, reading, and travel.

Donald Broughton will be greatly missed by his colleagues and other friends. He will be remembered as long as the people whom he influenced by his teaching and example survive and as long as the results of his pioneering developments continue to be employed and enjoyed.