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EDITORIAL

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Preface to the Kenneth N. Marsh Festschrift

It is with the utmost personal pleasure that I introduce this festschrift issue of the *Journal of Chemical and Engineering Data* (*JCED*) honoring the contributions of Professor Kenneth N. (Ken) Marsh to thermophysics and also to this journal. The manuscripts included in this issue cover many of the topics close to Ken's own prior interests, including (1) measurement of transport numbers; (2) measurement of electrolytic conductance of aqueous electrolytes; (3) methods to determine vapor−liquid equilibria, densities, viscosities, diffusion coefficients, enthalpies and volumes of mixing, compressibilities of pure liquids and liquid mixtures, (p, V_m, T) data, relative electric permittivities, virial coefficients of gases, enthalpies of combustion and sublimation, and heat capacities; (4) equations of state; and (5) databases. Ken has applied all of these to hydrocarbons, nonhydrocarbons, and ionic liquids as well as refrigerants and natural gas.

Ken was born in Melbourne, Australia. He received his B.Sc. (Honors) in Chemistry from the University of Melbourne and both his M.Sc. and Ph.D. in Physical Chemistry from the University of New England (Armidale, New South Wales, Australia), both of which were supervised by Professor Robin H. Stokes.[1] It was during his M.Sc. studies that Ken met his wife Barbara, with whom he has shared his assignments and 20 years as Editor-in-Chief (EIC) of *JCED*, for which Barbara was the journal office manager; we will return to this subject later. Ken and Barbara have three children and one grandchild. Ken has one known obsession, namely, Saab automobiles, a passion he has imparted to others.

Ken was awarded a Nuffield Fellowship in 1969 and departed Australia for the United Kingdom to work with both Professors Maxwell L. McGlashan[2] at the University of Exeter and Sir John Rowlinson[3] at Imperial College. The Marsh clan subsequently (albeit not always with the approval of his forbearing spouse) spent time in Sweden, New Zealand, China, Japan, Texas ("It's Like a Whole Other Country"),[4] Germany, and more recently Australia, to recount but a few. Ken and Barbara now reside in Arizona and fortunately avoided the 2011 earthquake in Christchurch. I first met Ken about 26 years ago at University College London when he was visiting fellow antipodeans Professor Max McGlashan and Professor Mike Ewing, the latter of whom was Ken's first Ph.D. student in Armadale and my Ph.D. supervisor.

The breadth and depth of Ken's contributions to thermophysics are astounding. During his B.Sc. studies, Ken measured transport numbers; his M.Sc. work involved measurements of electrolytic conductance of aqueous electrolytes, and for his Ph.D., he developed methods for measuring vapor−liquid equilibria, densities, viscosities, and diffusion coefficients of organic mixtures. As a lecturer in Armidale, Ken developed experimental methods for the measurement of vapor−liquid equilibria, enthalpies and volumes of mixing, compressibilities of pure liquids and liquid mixtures, dielectric constants, and virial coefficients of gases. The emphasis of the developed methods was to reduce both the measurement time and the uncertainty in comparison with previous techniques. Ken also developed equation-of-state methods for the prediction of properties of mixtures that utilized correct assumptions for the hard-sphere term in the van der Waals equation. It was on an extended visit to Sweden with Professor Stig Sunner that Ken performed enthalpy of combustion, enthalpy of sublimation, and heat capacity measurements. In 1983, Ken moved to the Thermodynamics Research Center (TRC), then located at Texas A&M University,[5] and became its director in 1986 (a history of TRC can be found elsewhere[6]). Ken continued an experimental program at Texas A&M, where with the thermodynamics group in Chemical Engineering he developed methods for measuring vapor pressure and (p, V_m, T) properties of fluids, with particular emphasis on components of natural gas and their mixtures as well as refrigerants and refrigerant mixtures. At Texas A&M, Ken also developed a total enthalpy calorimeter. For his work on natural gas, Ken was honored by the Gas Processors Association (GPA).[7] During this time, Ken's activity with both the International Union of Pure and Applied Chemistry (IUPAC)[8] and the Committee on Data for Science and Technology (CODATA)[9] of the International Council for Science increased in regard to databases. It was his experience with both IUPAC and CODATA and his presence at TRC with Dr. Randolph Wilhoit[10] that led to a digression from his experimental efforts into databases. This included the TRC Source Database, an archival database for the storage of all published measurements for pure organic compounds and their multicomponent mixtures, which contained estimates of uncertainties and other ancillary information sufficient to allow an evaluation

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of the literature data without reference to the original publications. In order to exchange thermophysical property data between databases and research groups, Ken and Randolph established the first fully functional data exchange protocol. Other output included *International Data Series* and *TRC Thermodynamic Tables: Hydrocarbons and Non-Hydrocarbons* as well as work for ASTM,[11] GPA, and DIPPR.[12] These projects were possible because of Ken's experimental background covering a broad range of methods. At TRC, Ken commenced implementation of his vision for databases that has been continued at NIST with the introduction of Guided Data Capture,[13] a collaboration with key journals[14] and ThermoML.[15] This system is mined daily for data by applications now routinely used by chemical engineers to perform daily tasks.

In 1997, Ken retired as director of the TRC and moved to the University of Canterbury (Christchurch, New Zealand), where he established an active research program on carbon dioxide removal (carbon sequestration) using alkanolamines, calorimetry of gas hydrates, thermophysical properties of room-temperature ionic liquids, and the development of methods for the measurement of relative electric permittivities and viscosities of fluids. Ken retired from the University of Canterbury in 2006, where he retains an appointment as an adjunct professor involved with studies concerning the solubility of cellulose and lignin in ionic liquids. Ken is now an adjunct professor at the University of Western Australia, returning to his roots, where he is involved in studies of vapor−liquid equilibria and calorimetric properties of natural gas and natural gas hydrates. He has also continued his international activities and most recently served as an inaugural director of the International Association of Chemical Thermodynamics.[16]

During his career, Ken has authored more than 200 publications in archival journals as well as 12 books. Somehow he also found time to serve as the EIC of *JCED* from 1991 to 2010, where he used his vast knowledge of experimental methods, uncertainty analyses, and databases to guide this journal on its way to becoming one of the most prominent repositories of chemical and engineering data. During his tenure as EIC, the number of submissions per year increased by a factor of more than 10, the journal changed from quarterly to monthly issue publication, and the number of published pages rose from 487 in 1991 to 5962 in 2010.[17] As EIC, Ken always insisted that authors comply with the rules of the game, including compliance with IUPAC recommendations,[18−20] the use of SI units,[21] and the reporting of uncertainties as specified by the International Standards Organization[22] (ISO).[23] Such measures, while an irritation to some, were recognized by all as correct and ultimately increased the overall value of the published results for those who use the data for both science and engineering.

This Festschrift is a testament to Ken and Barbara for their work. Indeed, Ken would not have been able to achieve all he has without Barbara. This issue is dedicated to both of them with thanks and affection from many colleagues, students, and friends who have had the privilege of working with them over the first 45 years of Ken's career.

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(4) A slogan coined to promote Texas to tourists within the U.S.
(5) "A&M" represents a symbolic link to the school's past but no longer officially stands for "Agricultural and Mechanical". The history of Texas A&M University can be found at http://www.tamu.edu/about/facts/history.html.
(6) See: http://trc.nist.gov/history.html.
(7) See: http://www.gasprocessors.com/.
(8) See: http://www.iupac.org.
(9) See: http://www.codata.org.
(10) See: http://symp16.nist.gov/pdf/p2367.pdf.
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(22) *Guide to the Expression of Uncertainty in Measurement*; International Organization for Standardization: Geneva, 1993. This Guide was prepared by ISO Technical Advisory Group 4 (TAG 4), Working Group 3 (WG 3). ISO/TAG 4 has as its sponsors the Bureau International des Poids et Mesures (BIPM), the International Electrotechnical Commission (IEC), the International Federation of Clinical Chemistry and Laboratory Medicine (IFCC), ISO, the International Union of Pure and Applied Chemistry (IUPAC), the International Union of Pure and Applied Physics (IUPAP), and the Organisation Internationale de Métrologie Légale (OIML). Although the individual members of WG 3 were nominated by BIPM, IEC, ISO, or OIML, the Guide was published by ISO in the name of all seven organizations.
(23) See: http://www.iso.org/iso/home.html