

Assessing the Quality of Thermophysical Property Measurements

Kenneth Marsh^{C, S}

*Dept. of Chemical and Process Engineering, University of Canterbury, Christchurch, New Zealand
Fluid Science & Resources Division, University of Western Australia, Perth, Western Australia, Australia*

ken.marsh@uwa.edu.au

A numerical value as a result of a measurement of a thermophysical property is meaningless without an assessment of the quality of that value. Early attempts by evaluators to assess data quality were hampered by the different meanings given to the various terms used to describe accuracy in measurements. Some of the earlier attempts to clarify the terms used to describe data quality and to assist experimentalist to either check the quality of their measurements or calibrate their equipment through the use of reference materials will be discussed. The publication by the International Organization for Standardization (ISO) of the Guide to the Expression of Uncertainty in Measurement in 1993 allowed authors and evaluators to start to standardize the terms used in assessing data quality in reported measurements. The major problem facing an evaluator of published thermophysical property data is determining what the authors mean when providing values of uncertainties. The major journals publishing thermophysical property data now require the authors to provide uncertainties at a specified level of confidence for all the measurement variables. Usually sufficient information about Type A uncertainties (uncertainties due to statistical variations in multiple measurements) is given by the authors. However the information given regarding Type B uncertainties (those based on scientific judgment using all the relevant information available including previous measurements, purity of materials, experience with the use of the instruments, manufacturer's specifications, calibrations, and uncertainties assigned as a result of measurements made with reference materials) is usually inadequate, often resulting in the evaluator rejecting the authors' assessment. Various examples of the pitfalls faced by an evaluator evaluating Type B uncertainties in thermophysical property measurements will be given. Once the quality of the data has been established, different database systems store the evaluation in different ways depending on the final use of the evaluated data. Various approaches will be discussed. These variations result in difficulties in developing robust data exchange protocols.