NIST-Journals Cooperation: Implementation of Two-Stage Review Process

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A new work flow has been implemented in support of the ongoing NIST-Journals cooperation. The work flow offers enhanced benefits to Editors, reviewers and authors of manuscripts that are submitted to the *Journal of Chemical and Engineering Data*, *Fluid Phase Equilibria*, *The Journal of Chemical Thermodynamics*, *International Journal of Thermophysics*, and *Thermochimica Acta*. When an author has submitted a new manuscript to these journals, a two-stage review process is initiated at NIST. The first stage provides to Editors a *NIST Literature Report* and the second stage provides a *NIST Data Report*. Editors can, at their discretion, make those reports available to peer reviewers and authors of the manuscript, with an overarching goal of fixing errors and improving the quality of published articles. These two reports are generated on demand by new functionality that NIST recently incorporated into *ThermoData Engine* (TDE) software. To generate a literature report, TDE searches the NIST data archives for published data closely related to the manuscript (e.g., the same thermophysical property, the subject compounds or mixtures). TDE compiles that information into a literature report that provides the number of articles on the same subject, along with ranges of specific variables and literature citations for selected articles on the same subject. This information assists Editors and reviewers with their assessment of the manuscript's scientific contribution, the degree of overlap with published data, and the need for comparison with published data. The second stage of NIST review should be completed just after peer review is completed, but always prior to an Editors' final decision. To generate a data report, TDE extracts related data that are stored in the NIST SOURCE archive, evaluates those data, fits data to models and compares the new data to those models, while taking into consideration experimental uncertainties. Firstly, such tests clearly reveal typographical errors in the data, when they exist. In addition, specifically for vapor-liquid equilibrium data, TDE carries out five consistency checks that are based on the requirements of the Gibbs-Duhem equation, plus a check for consistency with the pure-component vapor pressures. TDE reports an overall VLE data quality factor based on an internal algorithm. The results of data checking are compiled into a data report that is submitted to the Editor. The data report provides a complete assessment of data quality, their underlying uncertainties, their sample descriptions, and their descriptions of experimental methods. When the conference opens, the new work flow will have been part of operations for more than one year. Details of the implementation of the work flow will be described with examples that illustrate the new functionality of ThermoData Engine and benefits to Editors, reviewers and authors.