In search of accuracy: The road to high-quality certified reference materials to achieve comparability of chemical measurements

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The proper analysis of a product is the key step to guarantee high quality and safety for consumers in fields such as healthcare, food and environmental monitoring.

The ability to trace measurement results of an instrument or system ultimately back to a SI unit (Système international d'unités) is a critical aspect of ensuring the accuracy and reliability of measurements. Together with measurement uncertainty, metrological traceability is an important factor for a laboratory to meet the requirements of the ISO/IEC 17025 standard.

Recently, our R&D teams developed ready-to-use certified reference material (CRM) mixtures suitable for use as calibrants in LC-MS or GC-MS methods. All components of the mixes were internally synthesized or sourced externally, individually characterized, and their contents determined by quantitative nuclear magnetic resonance (qNMR) spectroscopy according to ISO/IEC 17025 accreditation [1]. Subsequently, these well-characterized batches were used as raw materials to prepare the final solutions by gravimetrically dissolving and diluting them in an appropriate solvent according to the ISO 17034 accreditation workflow [2]. The resulting bulk solutions were collected in ampules and the process controlled through homogeneity testing by LC-IDMS or GC-IDMS, respectively. The final ampules were further investigated thoroughly to guarantee stability of the product during transportation and throughout the whole shelf-life at storage temperature.

This presentation will provide an overview of the above-mentioned process along with a discussion of the importance for maintaining metrological traceability and reporting of overall uncertainty. Examples will be provided to demonstrate the wide-ranging application scope of certified reference materials in analytical testing contexts.

[1] ISO/IEC 17025:2017, “General requirements for the competence of testing and calibration laboratories”
[2] ISO 17034:2016, “General requirements for the competence of reference material producers”