For the Love of Chemistry

Penned by Connie Hayes, CEO

This month we will discuss Multi-Element Standards

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Multi-Element Standards

In 1983 the EPA conducted a survey of the attendees at an EPA user group regarding the need for National Bureau of Standards (NBS) certified standards for verifying ICP calibration solutions. This was a topic of general interest as similar conversations were lead at ASTM and ICP user group meetings, an Oak Ridge National Labs-Department of Energy conference, and other EPA seminars during this same timeframe. The conversations included numerous branches of the US government, universities, testing laboratories, and industries. While the sentiment was strong for the single-element standards, there was considerable interest in multi-element calibration standards. The following year, NBS began release of its single-element standards.

The advantage of the single-element NBS standards included:

- The flexibility of preparing custom composite mixes that would be suitable for a laboratory's specific needs
- Alleviation of a concern during that time of the possibility of spectral overlap problems that would come from the presence of additional elements
- Confidence. As this timeframe was prior to the availability of quality accreditations such as ISO Guide 34 (ISO 17034), there was considerable skepticism of the quality of commercially available multi-element standards.

However, by 1998 NBS began the release of 6 certified multi-element standards: SRM 3171-3176. These new SRMs were the result of several requests for mixes to address ASTM, EPA and RCRA requirements. In the middle of this communication was our founder, Theodore Rains. It was Ted Rains who would be instrumental in the manufacture and analysis of these NBS SRMs.

In going through Ted Rains' library of correspondence, I have wondered how he came to the decision of just which elements and concentrations would be involved. What questions needed to be examined prior to release of the SRMs? I discovered the processes of the 1980s were remarkably similar to our current processes.

The certified values were based upon gravimetric procedures, specifically weight per volume composition of high-purity metals or salts dissolved in NBS high-purity reagents. Ted Rains led a study of the short- and long-term stability of the final products packaged in HDPE bottles and stored in Class 100 clean area without any additional packaging. Included in this study was a verification against NBS standards. The storage conditions maintained a constant flow of air over the bottles to confirm any tendency for evaporation. The process of designing the multi-element standards came from NBS as a result of consultation with the same user groups.

Today our catalog multi-element offerings have gone through much the same process. As an ISO 17034 accredited manufacturer, we evaluate the homogeneity, short- and long-term stability and traceability to NIST SRMs following procedures that include the key elements of those original NBS processes.

And just as the design process came from a consultation with user groups associated with environmental and industrial entities, we obtain our selections from our customers. This month we are adding another stock item associated with EPA method 6020b. ICP-6020-1, an ICP-MS calibration solutions, is our latest addition. This product is similar to our ICP-200.8-1 stock item, with the difference being that the radioactive elements thorium and uranium are removed. This item can be found in our online catalog.

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