

Why Use Certified Reference Materials for Organic Analysis in Atomic Spectroscopy?

The growing role of certified reference materials (CRMs) in organic analysis

SPECTROSCOPY: How are reference materials used in the analysis process?

DYER: Reference materials are used to confirm the analytical test. They can be used to calibrate an instrument, with a validation test, or as a quality check on a calibrated testing instrument to make sure it remains within the industry-necessary requirements for whatever's being analyzed.

MANTEI: The accuracy of reference materials is important to ensure end-user materials meet specifications that can improve anything from safety and durability to reliability of the products they produce. For example, sulfur determination for oil and gas producers: They have to meet certain EPA requirements to reduce pollutants such as sulfur or mercury. The reference materials we offer are used in most of the analyzers for this type of testing.

DYER: They can also be used to check tests for sugars or starches in foods or by checking metals using inductively coupled plasma – mass spectrometry (ICP-MS).

SPECTROSCOPY: What is the difference between a reference material and a CRM?

DYER: A basic reference material is anything that is used as a comparative to differentiate items such as iron or copper. It has very basic needs and therefore has little means for precision or uncertainty. For example, a geologist identifying different types of rocks using a handheld X-ray analyzer would set that up with reference materials to identify the type of materials. It may not have an exact analysis but enough to identify the different compositions as they are walking around an area and checking things out.

A CRM offers a more in-depth characterization of the material, providing one or more accepted test methods, an uncertainty of what's being measured to a 95% confidence limit, and establishing metrological traceability and/or traceability to a National Metrology Institute (NMI) such as NIST or other 17034 credited references, and then is certified by an accredited reference material producer.

MANTEI: Interestingly, it was some of these organic reference materials that led to the creation of Alpha Resources. In 1978, the founders of Alpha saw a need for a reliable source of accurate coal reference materials. That need created one of the widest ranges of organic and inorganic certified reference materials for elemental combustion analysis in the market.

SPECTROSCOPY: What are the requirements of a facility to certify a material?

DYER: One requirement is they must be accredited. Someone can create a reference material and call it a CRM, but only an accredited 17034 can produce the CRM under strict guides that can be accepted by auditors within industries. To break this down, the ISO 9001 gives a defined quality management that many companies use to show they have a quality-minded system. ISO 17025 addresses a quality management structure that's necessary for an accredited testing laboratory to provide the data. Then an ISO 17034 serves as the quality management for a producing a CRM like Alpha Resources.



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MANTEI: As more companies move to the accredited lab status, the necessity for CRMs produced under these guidelines is becoming more important.

SPECTROSCOPY: What are the benefits of using a CRM versus a reference material?

DYER: The benefits of a CRM start with that they have an unbroken chain of traceability. They're based on a foundation of audits and accreditation bodies that show the competence of the reference material producer who provides the most accurate and precise CRM. All these are necessary to create confidence in an auditor and for a customer.

MANTEI: Kent, where does an unbroken chain of traceability get involved in this process?

DYER: It starts at the top of the analytical- and physical-known properties, such as mass or the mole. These are established by the NMI, such as NIST, and are approved by the International Bureau of Weights and Measures in France. So, the NMIs provide the foundation of a primary, known as benchmarks for analysis, and from these reference materials, we produce a secondary CRM that is 17034 accredited.

SPECTROSCOPY: When and why are CRMs preferred in analysis?

DYER: As industries evolve and change, there's an increasing need for a safety system and assurance that the product is of good integrity, and the quality drives the requirement for CRMs to be used more in testing applications.

MANTEI: What drives these changes—what industries?

DYER: Innovation drives it, as do consumers. But it began with the automotive and aerospace and has progressed into other testing requirements, such as environmental, coal, mining, food testing, etc.

SPECTROSCOPY: Where do you see the shift happening from simple reference materials to CRMs for organics?

DYER: The shift is happening as labs seek increased improvement in their quality system or changes in regulations. And as they do this, they will need to go from a reference material to a CRM and show their auditors they're using the CRMs for their testing.

MANTEI: Where do you see the biggest shift?

DYER: Labs have to meet these strict standards, so becoming accredited to industries such as mining and manufacturing, where they didn't have the requirement, has become more important for them to have a CRM.

SPECTROSCOPY: What precipitated the interest in CRMs for organics?

DYER: Quality and safety precipitated the need. The ISO movement began with the industries that have a big demand for quality, such as aerospace and automotive. The benefits that increased their quality and safety have now filtered into other factions of industry, and organic analysis is one of them.

MANTEI: How have you seen things evolve the most over the years?

DYER: When I first got started, prior to ISO and laboratory accreditation bodies, companies like GM or GE would send their top engineers and quality people to evaluate the lab and give them approval, so you had a letter that stated your approval. Sending folks out to evaluate a lab became problematic for the big corporations, as it was for labs to have auditors constantly coming through. So, accreditation bodies were formed to alleviate the strain. Subsequently, ISO was formed to provide an international forum such that everybody was on the same page for testing.

Initially, laboratories could operate under a 9001, but that didn't cover specific lab needs, so ISO 17025 standard was created, which covers testing and calibration. Then ISO 17034 was created to make sure that reference materials are being properly produced.