

TraceCERT™ Traceable Certified Reference Materials. Part 1: Swiss Precision Meets Analytical Competence

This is the first of a series of articles on Certified Reference Materials (CRMs) to appear in the upcoming issues of Analytix

By Michael Weber, Manager R&D Europe, Sigma-Aldrich Switzerland ... michael.weber@europe.sial.com
and Jürg Wüthrich, Senior Scientist R&D Europe, Sigma-Aldrich Switzerland ... jwuethrich@europe.sial.com



Sigma-Aldrich now brings metrological excellence directly to your lab

Due to the increasing demand for certified reference materials (CRM), Sigma-Aldrich established partnerships with several metrological institutes that serve as certifying bodies. For certified elemental and anion calibration solutions, we maintained a long-standing partnership with Swiss Federal Institute for Materials Science and Technology (EMPA). However, EMPA terminated all their activities in chemical metrology in 2004 and no longer acts as a national metrological institute.

Recognizing that EMPA's exit created the need for first-class CRM supplier in the market, Sigma-Aldrich made a strategic decision to acquire the metrological competency from EMPA and transfer it to our Buchs, Switzerland site. Cutting no corners, we began in 2005 to replicate the EMPA metrological environment in order to provide a seamless transition. First, we purchased from EMPA the unique equipment which was custom-designed to produce intercomparison samples of the highest metrological level. Second, we built a special, dedicated laboratory at the Buchs site where the high-precision weighing capabilities, homogenization and clean room

bottling equipment were installed. Third, and perhaps most importantly, we acquired technical know-how and experience by hiring two key EMPA personnel: the former Heads of EMPA's Metrological Reference and Certification Labs.

Now, barely a year after beginning the transfer of EMPA's competency to Sigma-Aldrich, we are proud to introduce the first CRMs developed and produced at our new Buchs facility: thirteen new TraceCERT™Ultra (ICP) and thirteen new TraceCERT™ (AAS) standards (**Table 1**).

Buying analytical standards is a matter of trust

Any measurement is only as good as the reference standard used to calibrate the system. Although other components of the system contribute to the uncertainty of the analysis, the calibration and reference solutions also contribute. When the accuracy of your measurement matters, it is important to start every analysis with a fresh vial of the highest quality, certified reference or calibration standards. TraceCERT™ standards, an abridgment of Traceable and CERTified, meet these requirements and bring a wealth of security and reliability to your analytical results.

TraceCERT™ products are characterized by

- Unique (metrological) level of accuracy and lot-specific values
- Traceability to at least two independent references (i.e. NIST, BAM or SI unit kg)
- Certification according to ISO Guide 35
- Highest-purity starting materials available
- Comprehensive documentation including proper uncertainty calculation, expiry date and storage data
- Certificates of ICP standards list up to 70 trace impurities
- ICP standards packaged in light- and gas-tight aluminum foil bags
- Competitively priced

Table 1 Newly-available Fluka TraceCERT™Ultra calibration standards for ICP and TraceCERT™ calibration solutions for AAS*

Element	Starting Material	Cat. No. TraceCERT™Ultra ICP Standard	Cat. No. TraceCERT™ AAS Standard
Aluminum	Al(NO ₃) ₃ × 9H ₂ O + HNO ₃	61935	39435
Arsenic	As ₂ O ₃ + NaOH + HNO ₃	01969	39436
Cadmium	Cd metal + HNO ₃	36379	51994
Calcium	CaCO ₃ + HNO ₃	19051	69349
Chromium	(NH ₄) ₂ Cr ₂ O ₇ + HNO ₃	68131	02733
Cobalt	Co metal + HNO ₃	30329	05202
Copper	Cu metal + HNO ₃	68921	38996
Iron	Fe metal + HNO ₃	43149	16596
Lead	Pb(NO ₃) ₂ + HNO ₃	41318	16595
Magnesium	Mg metal + HNO ₃	30083	42992
Mercury	Hg metal + HNO ₃	28941	16482
Nickel	Ni metal + HNO ₃	28944	42242
Zinc	Zn metal + HNO ₃	18562	18827

* ICP standards supplied in 100 mL HDPE bottles and sealed in an aluminum bag, including certificate. AAS standards supplied in 250 mL HDPE bottles, except for Hg which is bottled in 100 mL borosilicate white glass bottle.

Special Offer: 50% off
on your first order on
TraceCERT™Ultra ICP Standards

Please quote promotion code T98 when placing your order.
Valid until January 31st 2007.

Figure 2
Example of Zinc
TraceCERT™Ultra
certificate (front
page out of three
pages)



Our well-defined approach to CRM production leads to multiple-traceability and, as a further benefit, ensures that significant biases and systematic deviations are excluded to the fullest extent possible.

The rationale behind this series of CRM articles

There is much confusion and many misconceptions over traceability, uncertainty calculation and the proper use of reference materials. In the next six issues of *Analytix*, we will attempt to enlighten interested readers on the meaning behind important CRM-related terms and concepts, including

- What does traceability really mean?
- The proper method to calculate uncertainty
- Characterization and purity statement of high-purity starting materials
- Production, liquid handling and packaging on a metrological level
- Certification and accreditation
- Certification of custom standards

To actually produce CRMs that meet all these criteria, the entire development process, beginning from the selection of an appropriate starting material to the choice of a purpose-specific packaging, must be highly sophisticated. **Figure 1** (see below) shows an overview of the production and certification process we employ. Not only is the bottled solution compared to a reference material (NIST, BAM, etc.), the starting material is checked against a second, independent reference. A key step is that the weighing operation leads to direct traceability to the SI unit kilogram. Gravimetric preparation using pure materials is a practical and, in many cases, the most accurate calculation of concentration units, through conversion of mass and mole fraction to mass fraction. As a final step, we provide detailed, lot-specific information in the Certificate of Analysis supplied with every *TraceCERT™* product (**Figure 2**).

Our intention with these articles is to clearly demonstrate that the technical experts at our new facility in Buchs are firmly grounded in the science behind the production of high-quality analytical reference materials. This is the reason why we link our *TraceCERT™* line with the image of high-precision Swiss chronographs (courtesy of IWC Schaffhausen).

We realize that buying and using analytical standards is a measure of your trust in the supplier. In the upcoming series of technical articles, we hope to answer most of your questions about certified reference materials.

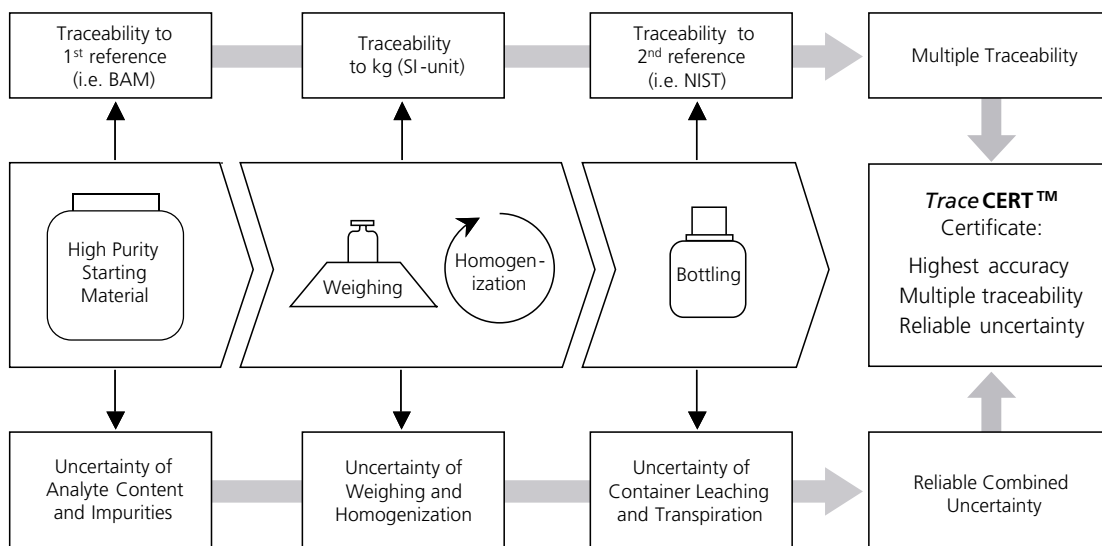


Figure 1 Schematic representation of the production design and certification of Sigma-Aldrich *TraceCERT™* products. This approach was established for the preparation of intercomparison samples at the highest metrological stage.