2022 INORGANIC VENTURES WEBINAR SERIES

# How It's Made

## Custom CRM Edition

**ASHLEY JONES**
TECH SUPPORT CHEMIST

Thursday | July 21 | 9:00 a.m. EST

# Intro to Inorganic Ventures' Certified Reference Materials

ISO Accredited

ACCREDITED ISO 17034 0883.02 BY A2LA

ACCREDITED ISO 17025 0883.01 BY A2LA

REGISTERED ISO 9001 QSR-1034 BY QSR

NIST traceable - We use NIST Standard Reference Materials (SRM™ and lot number specified on the certificate) for calibration and direct comparison.

Over 63,000 unique solutions available for order, 10-14 new solutions added daily

# How IV's CRMs are made

1. New custom products developed by Technical Support Chemists in a two step, PhD reviewed process.
2. Certified in-house concentrates manufactured from purity tested starting material.
   - Single or multielement high concentration CRMs used for aliquoting into our custom CRM products.

# How IV's CRMs are made continued – manufacturing overview

3. Once ordered, solutions go to the manufacturing department for production
   - Gravimetric preparation
   - CRMs are produced under our scope of accreditation, consistency maintained through audited Work Instructions

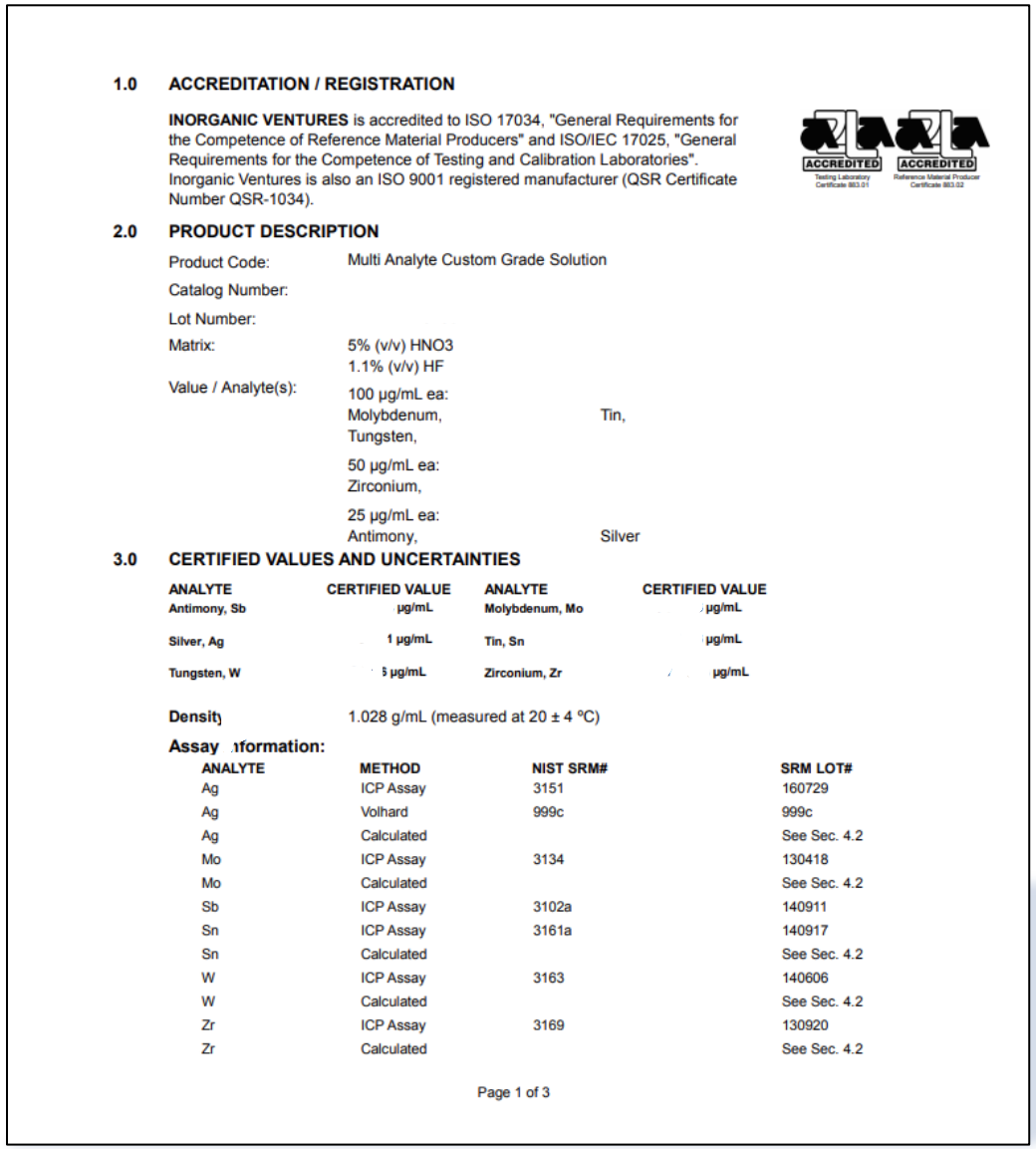
1. Technicians obtain their manufacturing breakdowns for solutions ordered.
2. Technicians collect in-house concentrates of appropriate concentrations and verify product, concentration, lot number, and density against breakdown.
3. Aliquots are weighed out according to final concentrations requested and added to the blend – once all aliquots are added the solution is diluted to final ordered volume by weight.
4. Solutions are mixed at least 50x by inversion before retains are taken for Quality Control and solution is passed off to be packaged.

# How IV's CRMs are made continued – certificate of analysis

4. Submitted to QC for verification of certified values calculated from the gravimetric manufacturing process.
    - COA generated by Product Documentation department

Certificate includes:

- ISO information
- Product Description
- Cert. Values/info on assay(s) used
- NIST Traceability info
- TMI if applicable
- Additional info on storage and handling



**1.0 ACCREDITATION / REGISTRATION**

**INORGANIC VENTURES** is accredited to ISO 17034, "General Requirements for the Competence of Reference Material Producers" and ISO/IEC 17025, "General Requirements for the Competence of Testing and Calibration Laboratories". Inorganic Ventures is also an ISO 9001 registered manufacturer (QSR Certificate Number QSR-1034).

**2.0 PRODUCT DESCRIPTION**

Product Code: Multi Analyte Custom Grade Solution

Catalog Number:

Lot Number:

Matrix: 5% (v/v) HNO3
1.1% (v/v) HF

Value / Analyte(s): 100 µg/mL ea: Molybdenum, Tungsten, Tin,

50 µg/mL ea: Zirconium,

25 µg/mL ea: Antimony, Silver

**3.0 CERTIFIED VALUES AND UNCERTAINTIES**

| ANALYTE | CERTIFIED VALUE | ANALYTE | CERTIFIED VALUE |
|---|---|---|---|
| Antimony, Sb | µg/mL | Molybdenum, Mo | µg/mL |
| Silver, Ag | 1 µg/mL | Tin, Sn | µg/mL |
| Tungsten, W | 5 µg/mL | Zirconium, Zr | µg/mL |

Density 1.028 g/mL (measured at 20 ± 4 °C)

Assay Information:

| ANALYTE | METHOD | NIST SRM# | SRM LOT# |
|---|---|---|---|
| Ag | ICP Assay | 3151 | 160729 |
| Ag | Volhard | 999c | 999c |
| Ag | Calculated | | See Sec. 4.2 |
| Mo | ICP Assay | 3134 | 130418 |
| Mo | Calculated | | See Sec. 4.2 |
| Sb | ICP Assay | 3102a | 140911 |
| Sn | ICP Assay | 3161a | 140917 |
| Sn | Calculated | | See Sec. 4.2 |
| W | ICP Assay | 3163 | 140606 |
| W | Calculated | | See Sec. 4.2 |
| Zr | ICP Assay | 3169 | 130920 |
| Zr | Calculated | | See Sec. 4.2 |

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Scan me to navigate to CoA/SDS search tool!

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# Benefits of gravimetric preparation

- More reliable and consistent than volumetric preparation
  - Avoid pitfalls of plastic consumables
    - adhesion
  - Increased accuracy
    - Limit affect of atmospheric pressure and temperature
    - Small margin of error (aliquots measured to 4 decimal places below 30g, 2 decimal places for +30g)
    - Viscosity
    - Ability to adjust aliquots weighed in secondary container
  - Reduce cost
    - Consumables – transfer pipettes vs pipette tips
    - Calibration of pipettes

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## Gravimetric Vs Volumetric Aliquot

Let's make a 100mL solution of 1000ppm Ca.
(Ca concentrate has concentration of 119,910ppm & density of 1.341 g/mL).

$$\left(\frac{100mL \times 1000ppm}{119910ppm}\right) = \mathbf{0.83396mL}$$

$$0.83396mL \times \frac{1.341g}{mL} = \mathbf{1.1183g}$$

Our volumetric aliquot is 0.8340mL – this should weigh 1.1183g

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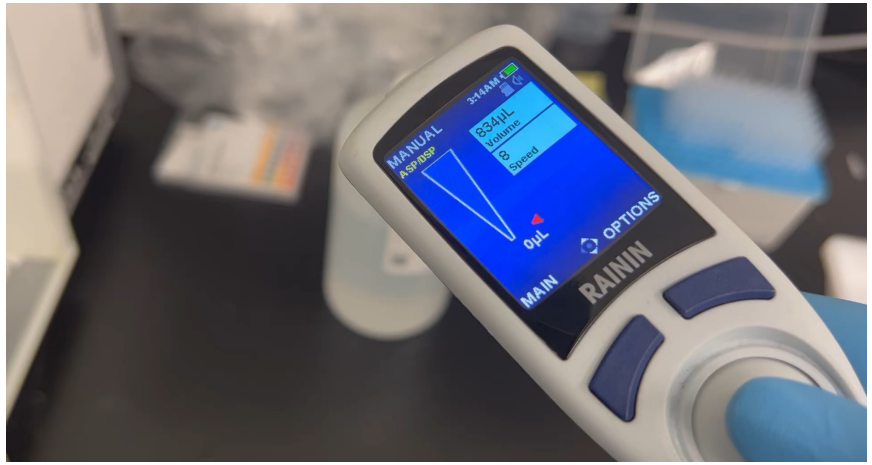


Theoretical aliquot = 1.1183g

From pipettor = 1.1107g

**0.68% variation**

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**3.93% variation**

# Why buy custom multielement blends?

- Reliability
  - Traceable results – unbroken chain of comparisons
  - Documentation associated with CRMs – audits
  - Reduce interferences associated with stock MEBs
  - Typical uncertainty of 0.5%
  - ISO accreditations/registrations
- Save time and money
  - Reduce waste and number of solutions to purchase
  - Simplify working solution preparation
  - Avoid the need for in-house stability and self-assigned usage periods
  - **Transpiration Control Technology**

# Transpiration Control Technology - TCT

- What is transpiration and why is it a concern?

- How does TCT solve that problem?
  - One-year vs five-year usage period
  - TCT allows more control over your method
    - Buy larger volume in series of smaller bottles
    - Maintain lot number
    - Reduce contamination potential
    - Control the expiration of your inventory


**Scan me to navigate to our TCT education page!**

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# Is TCT the only way to slow transpiration?

- Effects of transpiration can also be mitigated with refrigerated storage.
  - Allow standard to come to room temperature and mix by inversion 50x before use.

- Certificate of analysis also contains storage and handling information in Section 7.

> - Store between approximately 4° - 30° C while in sealed TCT bag.
>
> - While stored in the sealed TCT bag, transpiration of this CRM/RM is negligible. After opening the sealed TCT bag transpiration of the CRM/RM will occur, resulting in a gradual increase in the analyte concentration(s). It is the responsibility of the user to account for this effect. When the bottle is weighed both before and after being placed in storage, the mass difference observed will be a measure of transpiration mass loss.
>
> - After opening the sealed TCT bag, keep cap tightly sealed when not in use and store between 4° - 24° C to minimize the effects of transpiration. Use at 20° ± 4° C to minimize volumetric dilution error when using the reported density. Do not pipette from the container. Do not return removed aliquots to container.

# Visit our education page for more information and resources on frequently asked questions!

# Questions?