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Proper Selection and Use of Reference Materials

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Outline

General information about reference materials: types, application areas,...

Tools for proper selection and proper use of the reference materials to ensure good quality, accurate and traceable measurement results.

Use of Reference Materials for evaluating method performance and estimation of uncertainty. Available free applications and softwares.

Definitions

Reference Material (RM)

Material, sufficiently **homogeneous** and **stable** with respect to one or more specified **properties**, which has been established to be fit for its intended use in a measurement process.

Properties can be quantitative or qualitative, e.g. identity of substances or species.

Certified Reference Material (CRM)

Reference material characterized by a **metrologically valid procedure** for one or more specified properties, accompanied by a RM **certificate** that provides the **value** of the **specified property**, its associated **uncertainty**, and a statement of **metrological traceability**.

ISO GUIDE 33:2015: Ref. Materials: Good Practice in using RMs

Definitions

Calibrant

Reference material used for calibration of equipment or a measurement procedure



Quality Control Material

Reference material used for quality control of a measurement



ISO GUIDE 33:2015: Ref. Materials: Good Practice in using RMs

CRM Types

1) Calibrator CRM's (pure materials): Characterized for chemical purity and/or trace impurity. They are used for calibration purposes.



2) Standard Solutions & Gas Mixtures: They are prepared from pure materials by gravimetric mixing. They are used for calibration purposes.



3) Matrix CRM's (analyte in matrix): Characterized for major, minor and/or trace amount of constituents. Prepared from a matrix having the constituent or addition of constituents to the matrix or preparation of a synthetic matrix with major matrix components. Used for method development, validation and quality control purposes.



4) Physicochemical CRM's: Characterized for properties like melting point, viscosity and density.



5) Reference Objects and Human made artefacts: Characterised for functional properties such as octane number, flash point and hardness. Fiber type and microscopy samples characterized for microbiological properties are also belong to this group.



Key Characteristics of a RM according to common applications

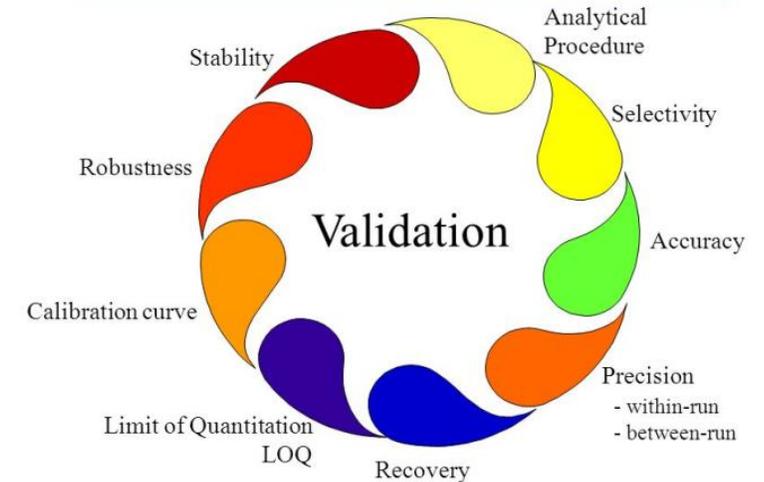
	Precision control	Bias control	Calibration/ conventional scales	Assigning values to other materials
	← RM →	← CRM →		
Specification of the property of interest	Required	Required	Required	Required
Property value		Required	Required	Required
Stated uncertainty		Required	Required	Required
Specified level of homogeneity	Required	a	a	a
Specified level of stability	Required	a	a	a
Statement of metrological traceability		Required	Required	Required
Instructions for use	Required	Required	Required	Required
Expiry date of the certificate		Required	Required	Required

^a Uncertainty contribution included in the stated uncertainty associated with the property value.

Application Areas of CRMs

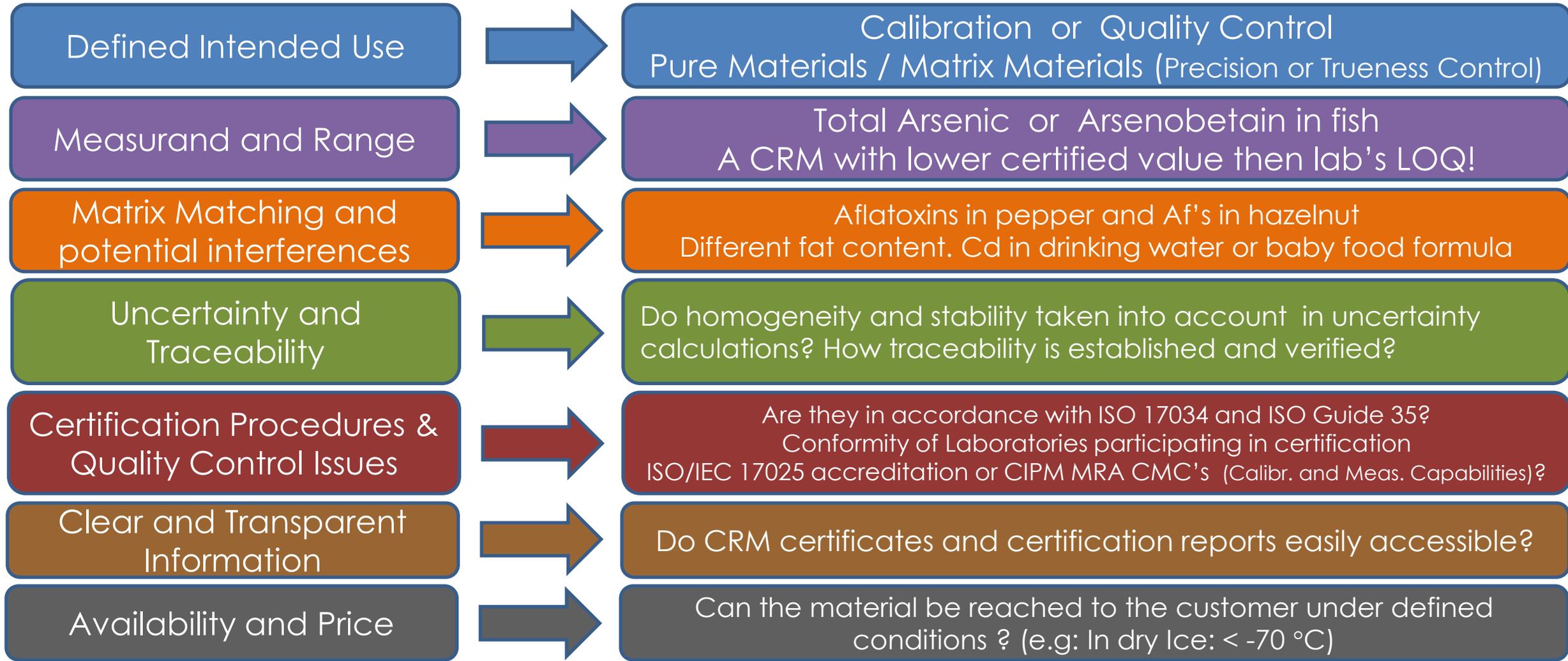
- Method development
- Method validation
 - Evaluation of trueness
 - Estimation of uncertainty
- Calibration
- Method performance evaluation
 - Within Lab, Quality Control ('charts')
 - Evaluation of analyst or instrument performance
- Proficiency Tests
 - Validation of Proficiency (external comparison)
- Assigning value to other materials

Analytical method validation



CRM's can serve for all of these applications if they are properly selected and properly used!

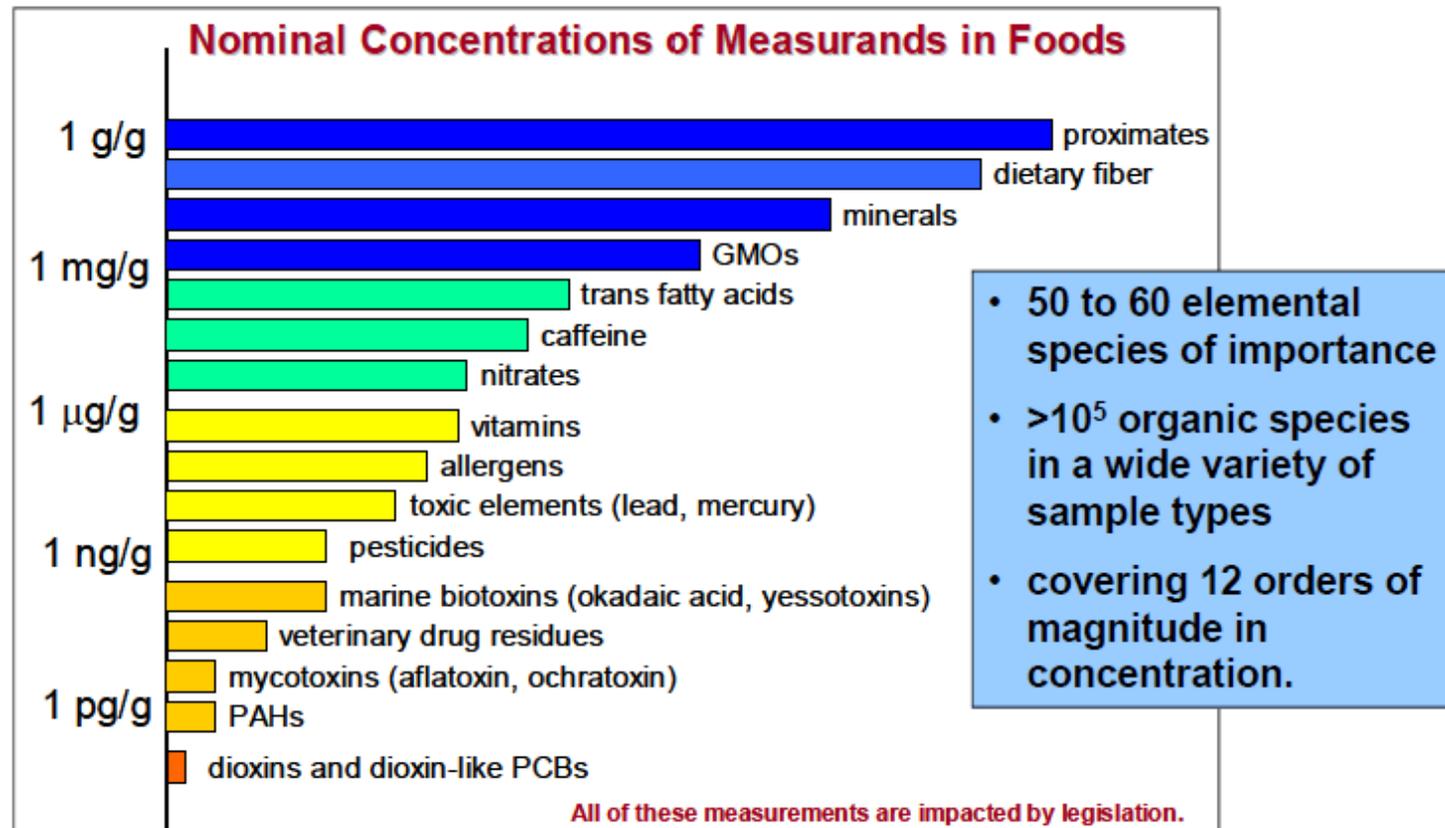
Proper Selection of RMs



Measurement Range (Food Example)

Regulated Classes of Chemicals in Foods

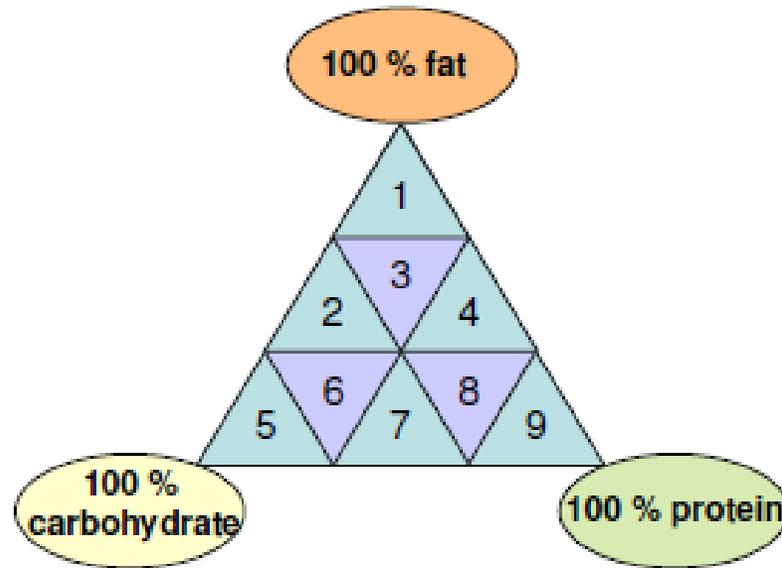
(there are multiple measurands within each class)



Source: Presentation of Dr. Willie E. May, Consultative Committee for Amount of Substance: Metrology in Chemistry and Biology (CCQM), 25th Meeting of CGPM, Paris, 2014

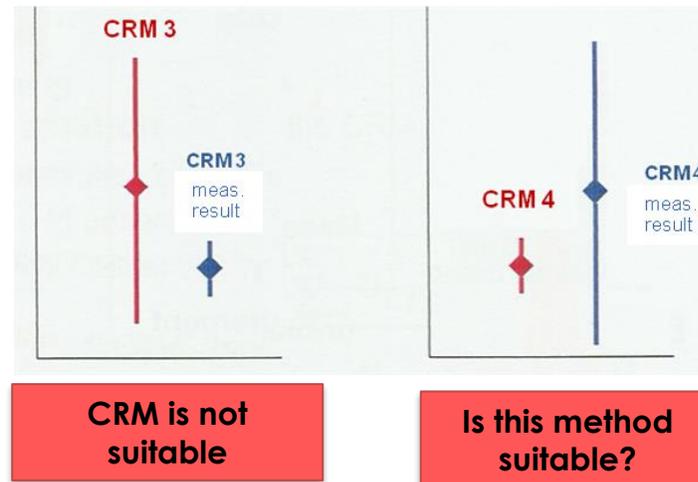
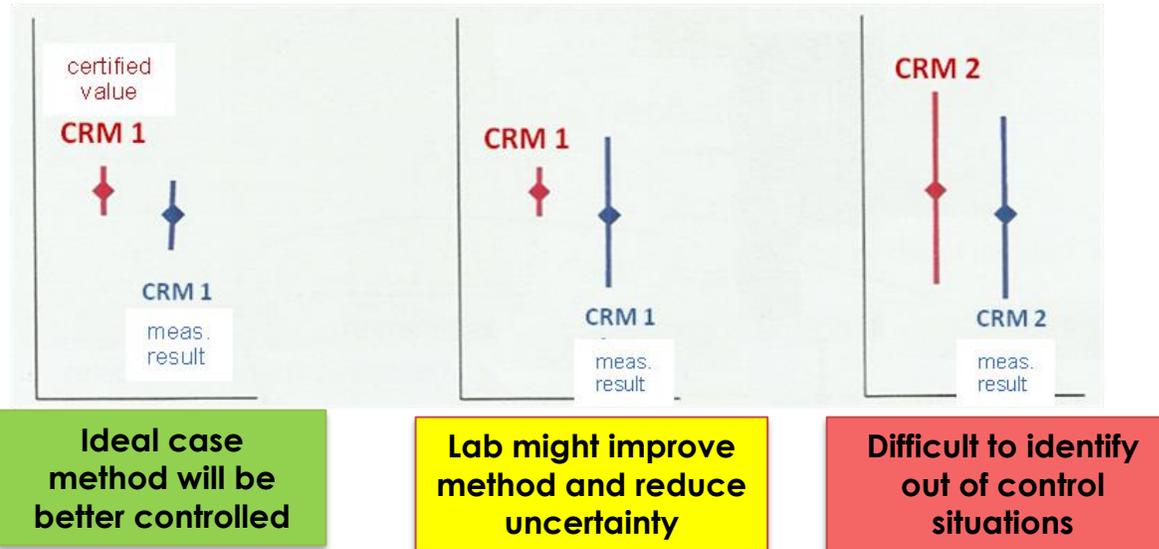
Matrix Matching (Food Matrices)

Example: AOAC fat-protein-carbohydrate triangle



If no matrix-matching CRM is available:
– standard addition better option ?

Evaluation of CRM Uncertainties



Metrological Traceability

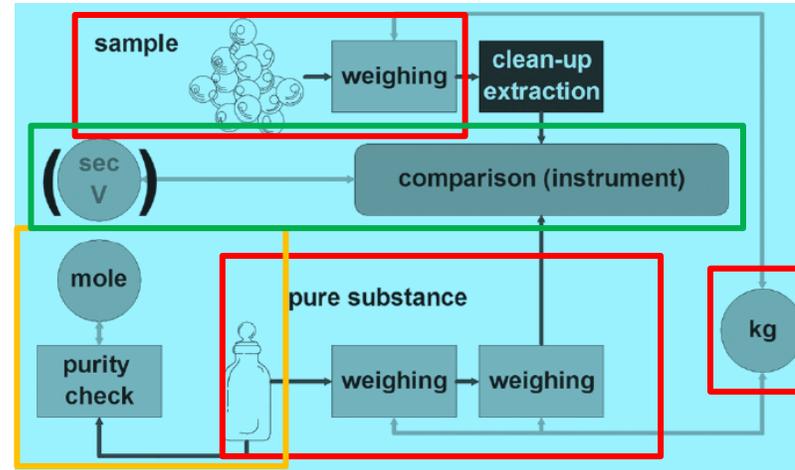
"Once measured, everywhere accepted" requires Comparability through Traceability

Metrological traceability

Property of a **measurement result** whereby the result can be related to a reference **through an unbroken chain** of calibrations, each contributing to the **measurement uncertainty**

JCGM 200:2008 (VIM 3)

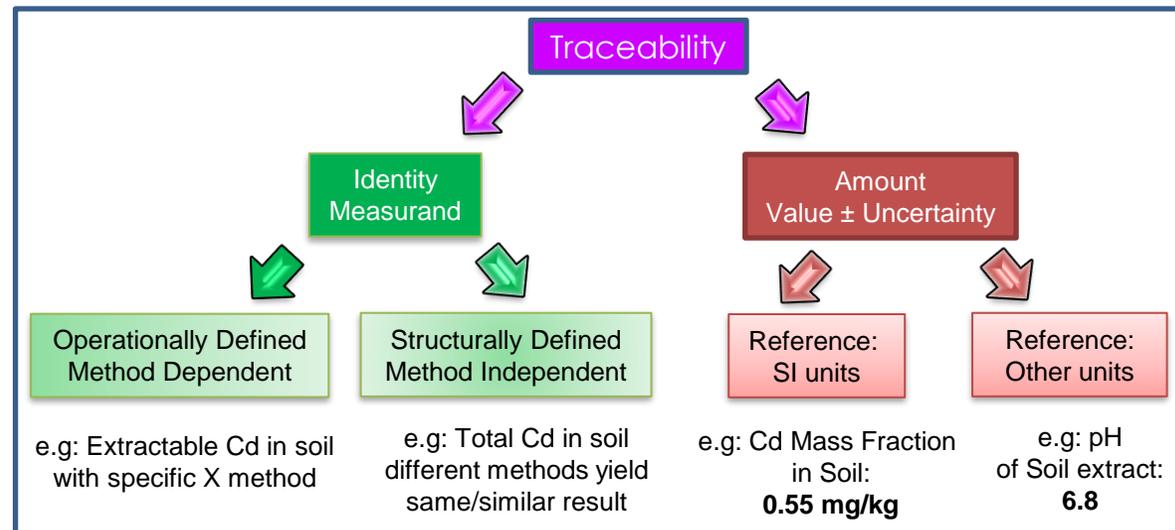
Traceability to the SI, or if not (yet) possible to another internationally agreed reference (hardness, pH, WHO International Units)



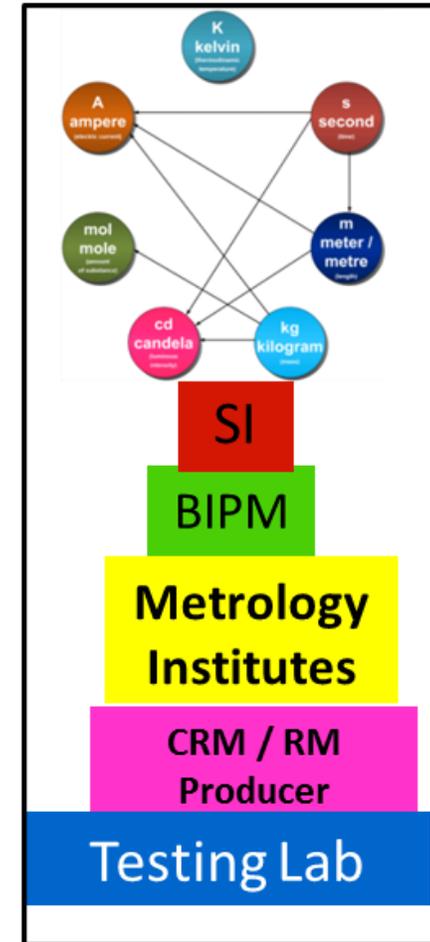
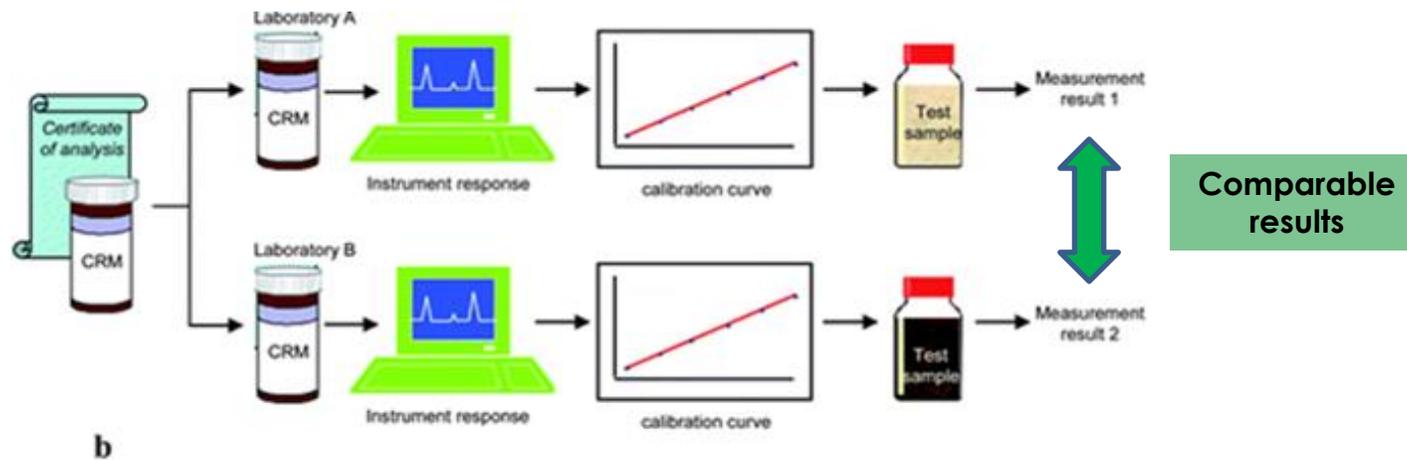
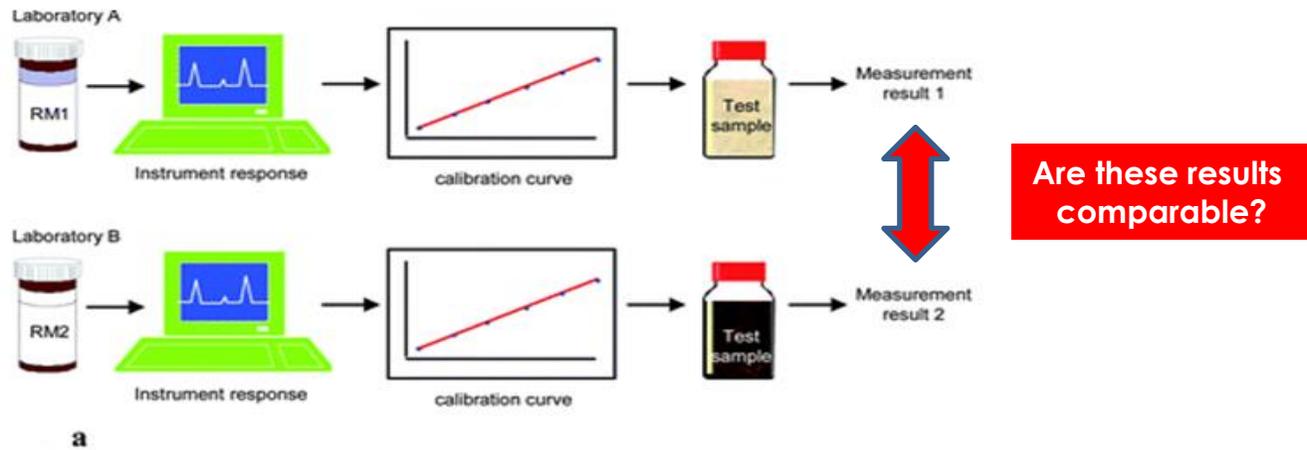
Traceability to the mole or other SI units

- Amount of substance : mol
 - Amount fraction : mol/mol
 - Amount concentration : mol/m³
 - Mass concentration : kg/m³
 - Amount content : mol/kg
 - Mass fraction : kg/kg
- (or expressed in multiples or sub-multiples) and

➤ Identification of the entity (measurand/analyte)



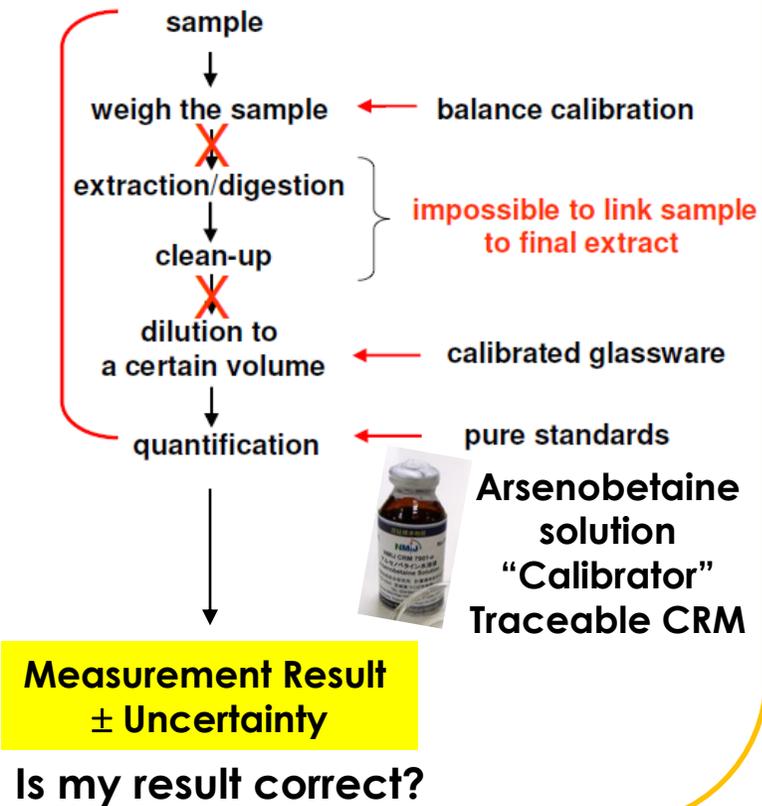
Comparability of Results & Dissemination of Traceability



ISO/TR 16476 Reference materials
Establishing and expressing metrological traceability
of quantity values assigned to RMs

Potential Problems in Traceability

Arsenobetain in Fish



Arsenobetaine in Seabass Matrix CRM



Certified Value ± Uncertainty

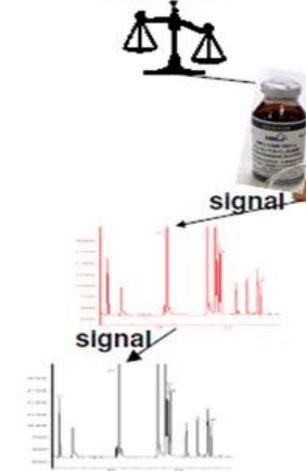
Compare

CRM Measurement Result ± Uncertainty

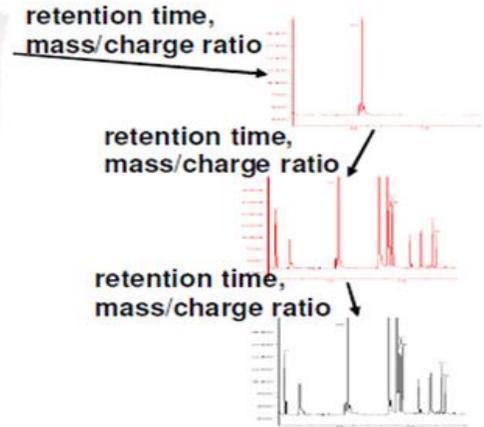
Verification of Traceability

QUANTITY

? Purity?



IDENTITY



Proper method for comparison:
ERM Application Note 1 or

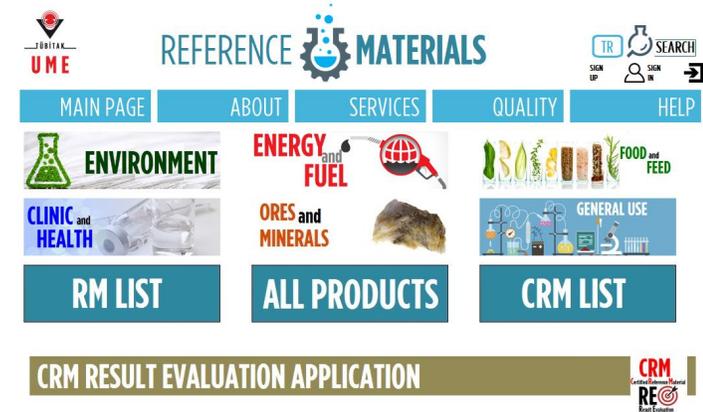


Free Online CRM Meas. Result Evaluation Application



- Proper evaluation of measurement results of a certified reference material is very important.
- For this purpose [ERM Application Note 1](#) was published by European Commission Joint Research Center to help laboratory personnel with exploiting the full potential of certified reference materials.
- An [excel file](#) was also added to the corresponding application note to check if a measurement result differs from the certified value.
- ✓ Here we developed an alternative online CRM Result Evaluation application: “CRM RE” by which you can easily evaluate your CRM measurement results without need of another software or programme. In addition application can automatically create Quality Control Charts to evaluate your performance at different times.
- ✓ For TUBITAK UME CRM's you don't need to enter certified values and uncertainties since they are already available in the application's database.
- ✓ Application is tested with Google Chrome. We recommend Google Chrome to use with the application. Please do not use browser's back and forward buttons in order to navigate in the application. And, to restart the application from the beginning please click application logo on the top left of the window

For technical support and assistance please contact ume.rm-info@tubitak.gov.tr



https://rm.ume.tubitak.gov.tr/en/crm_re/



CRM RE Result Evaluation Application



Do you want to evaluate results of a TÜBİTAK UME CRM?

YES

NO

Please select the TUBITAK UME CRM of interest from the list below.

Select

- Select
- UME CRM 1201 - Elements in Spring Water
- UME CRM 1202 - Elements in Hazelnut**
- UME CRM 1203-1 - Sulfur in Diesel
- UME CRM 1203-2 - Sulfur in Diesel
- UME CRM 1204 - Elements in Waste Water
- UME CRM 1205 - Colemanite
- UME CRM 1301 - Chloramphenicol
- UME CRM 1302 - Aflatoxins in Dried Fig
- UME CRM 1308 - 25-Hydroxy Vitamin D2 and 25-Hydroxy Vitamin D3 in Lyophilized serum
- UME CRM 1309 - Sucrose
- UME CRM 1310 - Glucose
- UME CRM 1311 - Fructose
- UME CRM 1312 - Honey (unadulterated)
- UME CRM 1313 - Honey (adulterated)
- UME CRM 1314 - Amino Acids in Plasma, Lyophilized
- UME CRM 1315 - Organic Acids in Urine, Lyophilized
- UME CRM 1401 - Certified pH 4 Buffer
- UME CRM 1402 - Certified pH 7 Buffer
- UME CRM 1403 - Certified pH 10 Buffer



Please select the TUBITAK UME CRM of interest from the list below.

UME CRM 1202 - Elements in Hazelnut

Please select one parameter for UME CRM

Select

- Select
- B
- Ca
- Cd**
- Co
- Cu
- Fe
- Mg
- Mn
- Ni
- Sr
- Zn

Next

https://rm.ume.tubitak.gov.tr/en/crm_re/



CRM RE Result Evaluation Application



Date:	01.10.2019	Result:	6.6	µg/kg	Remove
Date:	02.10.2019	Result:	6.9	µg/kg	Remove
Date:	03.10.2019	Result:	7.7	µg/kg	Remove
Date:	04.10.2019	Result:	6.5	µg/kg	Remove
Date:	05.10.2019	Result:	5.0	µg/kg	Remove
Date:	06.10.2019	Result:	6.3	µg/kg	Remove

Add

UME CRM 1202
Elements in Hazelnut
Parameter : Cd

C_{CRM} : 6.4 µg/kg
U_{CRM} : 0.9 µg/kg (k=2)

Previous Next

Please fill the data on uncertainty of the measurement

Is full uncertainty budget available? YES NO

Approach Used to Estimate the Measurement Uncertainty Value				
Bottom Up	<input checked="" type="radio"/>	Step by step or component by component, fish bone		
Top Down	<input type="radio"/>	Result of intra and inter laboratory studies without identifying every individual source of error		
Date	Result	Expanded measurement uncertainty U _m	Coverage Factor (k)	Autofill from the first entry
2019-10-01	6.6	0.2	2	
2019-10-02	6.9	0.2	2	<input type="checkbox"/>
2019-10-03	7.7	0.3	2	<input type="checkbox"/>
2019-10-04	6.5	0.2	2	<input type="checkbox"/>
2019-10-05	5.0	0.2	2	<input type="checkbox"/>
2019-10-06	6.3	0.2	2	<input type="checkbox"/>

Previous Next

https://rm.ume.tubitak.gov.tr/en/crm_re/



CRM RE Result Evaluation Application

EVALUATION OF MEASUREMENT RESULTS OF
UME CRM 1202 ELEMENTS IN HAZELNUT FOR Cd



#	Analysis Date	Mesasurement Result C_m	Expanded Measurement Uncertainty U_m	Coverage Factor Measurement k	Bias Δ	$2 u_{\Delta}$	Evaluation of Difference Between Measurement Result and Certified Value at a confidence level of approximately 95% According to ERM Application Note 1 📄	
1	01.10.2019	6.6	0.2	2	0.20000	0.92195	$ \Delta \leq 2 u_{\Delta}$	There is no significant difference
2	02.10.2019	6.9	0.2	2	0.50000	0.92195	$ \Delta \leq 2 u_{\Delta}$	There is no significant difference
3	03.10.2019	7.7	0.3	2	1.30000	0.94868	$ \Delta > 2 u_{\Delta}$	There is significant difference
4	04.10.2019	6.5	0.2	2	0.10000	0.92195	$ \Delta \leq 2 u_{\Delta}$	There is no significant difference
5	05.10.2019	5	0.2	2	-1.40000	0.92195	$ \Delta > 2 u_{\Delta}$	There is significant difference
6	06.10.2019	6.3	0.2	2	-.10000	0.92195	$ \Delta \leq 2 u_{\Delta}$	There is no significant difference

Difference Between Measurement Result and Certified Value = $\Delta_m = C_m - C_{CRM}$

Standart Uncertainty of Bias = $u_{\Delta} = \sqrt{u_m^2 + u_{CRM}^2}$

Show Quality Control Chart

Printable Version

UME CRM 1202, Elements in Hazelnut, Cd, C_{CRM} :6.4 µg/kg, U_{CRM} :0.9 µg/kg, $k=2$

https://rm.ume.tubitak.gov.tr/en/crm_re/



CRM RE Result Evaluation Application

Quality Control Chart



https://rm.ume.tubitak.gov.tr/en/crm_re/

Upper Control Limit = **UCL** = $C_{CRM} + 3u_{\Delta-avg}$, Lower Control Limit = **LCL** = $C_{CRM} - 3u_{\Delta-avg}$
Upper Warning Limit = **UWL** = $C_{CRM} + 2u_{\Delta-avg}$, Lower Warning Limit = **LWL** = $C_{CRM} - 2u_{\Delta-avg}$

$$u_{\Delta} = \sqrt{u_m^2 + u_{crm}^2}$$

Mean of calculated u_{Δ} values = $u_{\Delta-avg} = 0.463$

Show Evaluation Table



CRM RE Result Evaluation Application



Result Evaluation for Other CRMs

Do you want to evaluate results of a TÜBİTAK UME CRM?

YES

NO



Code of CRM (optinal)

ERM-BB445

Name of CRM (optinal)

PCBs in Pork Fat

Certified parameter (optional)

PCB 52

Certified value of CRM for mentioned parameter *

12.9

Expanded CRM uncertainty
 U_{CRM} *

0.9

Coverage factor (k) *

2

Unit *

µg/kg

*: Required Fields

Next

https://rm.ume.tubitak.gov.tr/en/crm_re/



CRM RE Result Evaluation Application



Result Evaluation for Other CRMs

Date:	01.02.2019	Result:	16.4	µg/kg	Remove
Date:	02.02.2019	Result:	13.1	µg/kg	Remove
Date:	03.02.2019	Result:	13.2	µg/kg	Remove
Date:	04.02.2019	Result:	16.0	µg/kg	Remove
Date:	05.02.2019	Result:	15.0	µg/kg	Remove
Date:	06.02.2019	Result:	11.9	µg/kg	Remove

Add

Previous Next



https://rm.ume.tubitak.gov.tr/en/crm_re/



Please fill the data on uncertainty of the measurement

Is full uncertainty budget available? YES NO

In the absence of full uncertainty budgets, approximations

b)

Within laboratory reproducibility (intermediate precision) standard deviation (std):	1.79963
Total number of measurements (n):	6
Standard uncertainty of measurement ($u_m = \text{STD}/n$):	0.735

Displayed numbers are calculated from the inserted measurement results

ii)

A reproducibility standard deviation from other sources (e.g. the certification or proficiency test reports):	
Total number of participant laboratories:	
Standard uncertainty of measurement ($u_m = \text{STD}/n$):	

Please note that performance of your method should be equivalent to performance of participants' method of the intercomparison study

iii)

The standard deviation of the measurements can be used as very rough estimation (std):	
Total number of measurements (n):	
Standard uncertainty of measurement ($u_m = \text{STD}/n$):	

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CRM RE Result Evaluation Application



Result Evaluation for Other CRMs

EVALUATION OF MEASUREMENT RESULTS OF
ERM-BB445 FOR PCB 52

#	Analysis Date	Mesaurement Result C_m	Expanded Mesaurement Uncertainty U_m	Covrage Factor Mesaurement k	Bias Δ	$2 u_{\Delta}$	Evaluation of Difference Between Measurement Result and Certified Value at a confidence level of apprximately 95% According to ERM Application Note 1
1	01.02.2019	16.4	1.46939	2	3.50000	1.72311	$ \Delta > 2 u_{\Delta}$ There is significant difference
2	02.02.2019	13.1	1.46939	2	0.20000	1.72311	$ \Delta \leq 2 u_{\Delta}$ There is no significant difference
3	03.02.2019	13.2	1.46939	2	0.30000	1.72311	$ \Delta \leq 2 u_{\Delta}$ There is no significant difference
4	04.02.2019	16	1.46939	2	3.10000	1.72311	$ \Delta > 2 u_{\Delta}$ There is significant difference
5	05.02.2019	15	1.46939	2	2.10000	1.72311	$ \Delta > 2 u_{\Delta}$ There is significant difference
6	06.02.2019	11.9	1.46939	2	-1.00000	1.72311	$ \Delta \leq 2 u_{\Delta}$ There is no significant difference

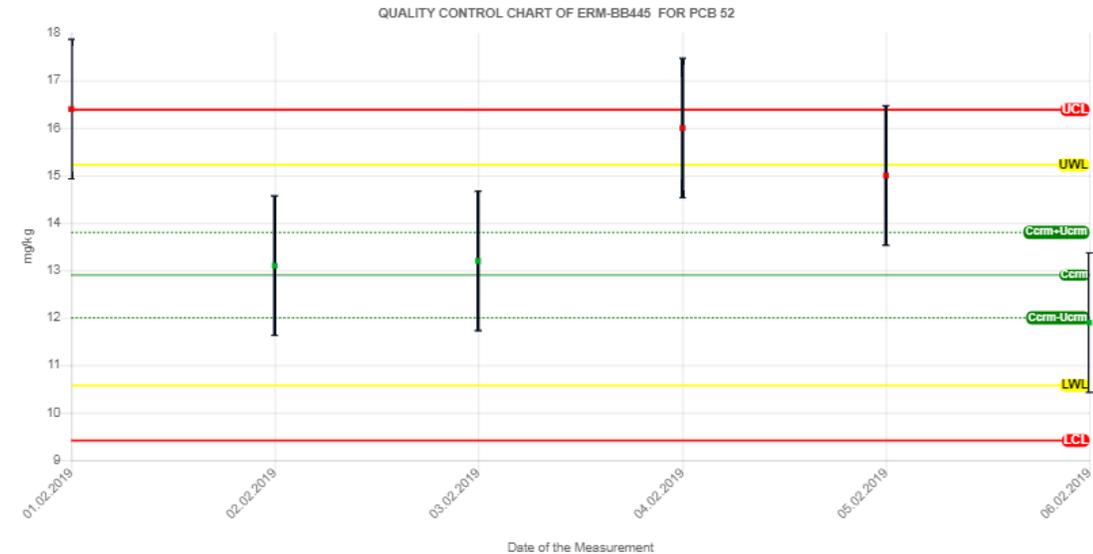
Difference Between Measurement Result and Certified Value = $\Delta_m = C_m - C_{CRM}$

Standart Uncertainty of Bias = $u_{\Delta} = \sqrt{u_m^2 + u_{CRM}^2}$

Show Quality Control Chart

Printable Version

ERM-BB445, PCBs in Pork Fat, PCB 52, C_{CRM} :12.9 $\mu\text{g}/\text{kg}$, U_{CRM} :0.9 $\mu\text{g}/\text{kg}$, k :2



Upper Control Limit = $UCL = C_{CRM} + 3u_{\Delta}$, Lower Control Limit = $LCL = C_{CRM} - 3u_{\Delta}$

Upper Warning Limit = $UWL = C_{CRM} + 2u_{\Delta}$, Lower Warning Limit = $LWL = C_{CRM} - 2u_{\Delta}$

$u_{\Delta} = \sqrt{u_m^2 + u_{CRM}^2}$
Mean of calculated u_{Δ} values = $u_{\Delta,avg} = 1.162$

Show Evaluation Table

Printable Version

ERM-BB445, PCBs in Pork Fat, PCB 52, C_{CRM} :12.9 $\mu\text{g}/\text{kg}$, U_{CRM} :0.9 $\mu\text{g}/\text{kg}$, k :2

You have chosen full uncertainty budget available as 'NO'. Please change the selectbox to see for the dirrent evaluation options

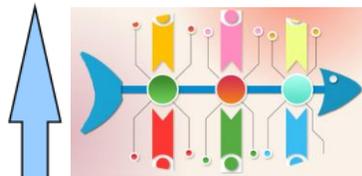


https://rm.ume.tubitak.gov.tr/en/crm_re/



Use of CRMs for Uncertainty Estimations

Uncertainty



According to GUM starting from the model equation and considering all individual uncertainty contributions

Bottom up



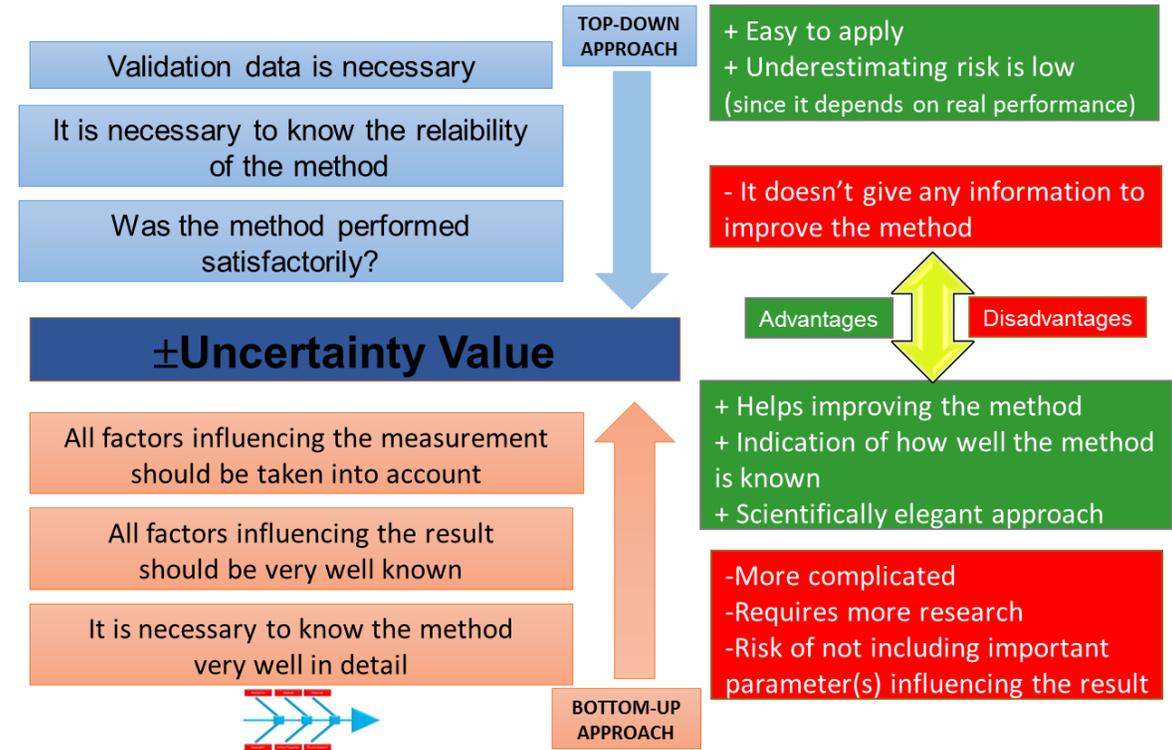
Top down



Phenomenological approach basing on validation and QC data assuming that they

- cover all influence factors and
- that they are representative for all measurements with this method

Uncertainty

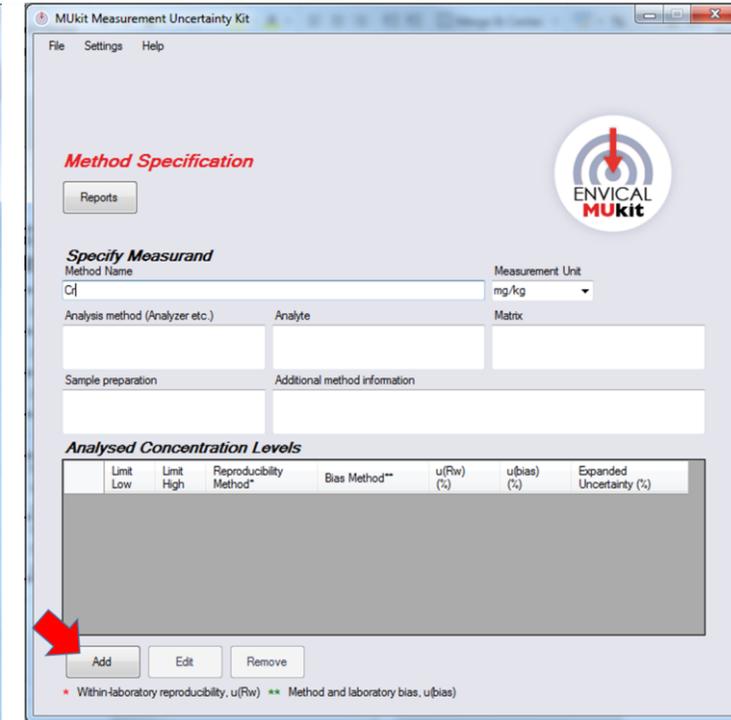
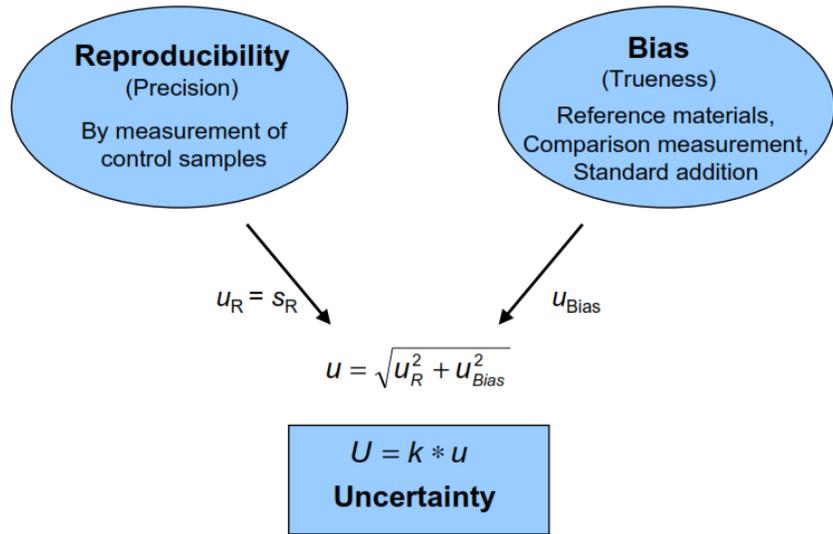


NORDTEST Top-Down Approach for Uncertainty

NORDTEST

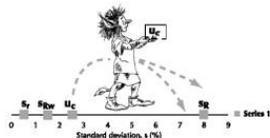
Nordic cooperation – Removing barriers – Approved once accepted everywhere

according to „Nordtest“:



NORDTEST NT TR 537 edition 4 2017:11

Handbook for Calculation of Measurement Uncertainty in Environmental Laboratories



[http://www.syke.fi/en-US/Services/Quality and laboratory services/Calibration services and contract laboratory/MUKit Measurement Uncertainty Kit](http://www.syke.fi/en-US/Services/Quality%20and%20laboratory%20services/Calibration%20services%20and%20contract%20laboratory/MUKit%20Measurement%20Uncertainty%20Kit)



MUKit Software for Uncertainty

Uncertainty Calculation for a Concentration Range

Quantifying measurement uncertainty for a certain concentration level
Parameters

Save Unfinished Cancel Settings Parameters > Control Samples > Certified Reference ... > Results

Parameters

Concentration Range ⓘ

Low Limit (mg/kg) High Limit (mg/kg)

Within-laboratory reproducibility - $u(Rw)$ ⓘ

Control sample covering the whole analytical process

Method and Laboratory bias - $u(bias)$ ⓘ

Certified reference material / Control Sample

* Compulsory fields for the counting.
** Fields needed for a complete Nordtest Report.

Next

Uncertainty Calculation for a Concentration Range

Quantifying measurement uncertainty for a certain concentration level
Control Samples

Save Unfinished Cancel Settings Parameters > Control Samples > Certified Reference ... > Results

Control Samples ⓘ Bring from Worksheet

Standard Deviation (%) Date of First Measurement **

1.996948 * 03 Mart 2022 Perşembe

Average Concentration (mg/kg) Date of Last Measurement **

12.06 ** 03 Mart 2022 Perşembe

Number of Measurement Results Matrix **

15 **

Additional Information

Cr Mass Fraction in Soil QC Measurements Validation Data (mg/kg)								
	Day1	Day2	Day3	Day4	Day5	Average	SD (mg/kg)	RSD (%)
Replicate 1	12.1	11.8	12.4	11.8	11.9	12.06	0.24	1.996948
Replicate 2	12.2	12	12.3	11.9	11.7			
Replicate 3	12.2	11.9	12.4	12	11.8			

* Compulsory fields for the counting.
** Fields needed for a complete Nordtest Report.

Back Next

[http://www.syke.fi/en-US/Services/Quality and laboratory services/Calibration services and contract laboratory/MUKit Measurement Uncertainty Kit](http://www.syke.fi/en-US/Services/Quality%20and%20laboratory%20services/Calibration%20services%20and%20contract%20laboratory/MUKit%20Measurement%20Uncertainty%20Kit)

MUKit Software for Uncertainty

Uncertainty Calculation for a Concentration Range

Quantifying measurement uncertainty for a certain concentration level
Certified Reference Materials

Save Cancel Settings Parameters > Control Samples > Certified Reference... > Results

New CRM

Standard Deviation of Measured Conc. (%) * Number of Measurements * Certified Concentration (mg/kg) * Date of Last Measurement ** Additional Information

Measured Concentration (mg/kg) * Standard Uncertainty of Certified Conc. (%) * Date of First Measurement ** Matrix **

CRMs

Certified Concentration	Standard Uncertainty of Certified Conc. (%)	Measured Concentration	Standard Deviation of Measured Conc. (%)	Number of Measure	Date of First Measurement	Date of Last Measurement	Matrix	Additional Information
12.8	3.125	12.78	2.9856299	6				

Certified value	CRM Standard Uncert.	CRM Standard Uncert. (%)
12.8	0.4	3.125

CRM measurement results	Rep. 1	Rep. 2	Rep. 3	Rep. 4	Rep. 5	Rep. 6	Avg.	SD (mg/kg)	RSD (%)
Cr Mass Fraction (mg/kg)	12.3	12.5	13.1	12.9	13.3	12.6	12.78	0.38	2.9856299

Remove

* Compulsory fields for the counting.
** Fields needed for a complete Nordtest Report.

Uncertainty Calculation for a Concentration Range

Quantifying measurement uncertainty for a certain concentration level
Results

Save Cancel Settings Parameters > Control Samples > Certified Reference... > Results

i	1
Certified concentration, $c_{ref\ i}$	12.8 mg/kg
Standard uncertainty of certified concentration, $u(c_{ref\ i})$	3.13 %
Measured concentration, c_i	12.78 mg/kg
Standard deviation of measured concentration, $s_{bias\ i}$	2.99 %
Number of Measurements, n_i	6
$bias_i = \frac{c_i - c_{ref\ i}}{c_{ref\ i}} \cdot 100\%$	-0.16 %
Period of measurements	-
Matrix	
Additional information	

3 Quantify method and laboratory bias, $u(bias)$

$$u(bias) = \sqrt{bias_1^2 + \left(\frac{s_{bias_1}}{\sqrt{n_1}}\right)^2} + u(c_{ref\ 1}) = 3.36\ %$$

4 Convert components to standard uncertainty

$$u(R_w) = 2.00\ %$$

$$u(bias) = 3.36\ %$$

5 Calculate combined standard uncertainty, u_c

$$u_c = \sqrt{u(R_w)^2 + u(bias)^2} = 3.91\ %$$

6 Calculate expanded uncertainty, U

$$U = 2 \cdot u_c = 7.9\ %$$

[http://www.syke.fi/en-US/Services/Quality and laboratory services/Calibration services and contract laboratory/MUKit Measurement Uncertainty Kit](http://www.syke.fi/en-US/Services/Quality%20and%20laboratory%20services/Calibration%20services%20and%20contract%20laboratory/MUKit%20Measurement%20Uncertainty%20Kit)

COMAR Database to Search for Suitable CRMs

CERTIFIED REFERENCE MATERIALS COMAR DATABASE

HOME > REFERENCE MATERIALS > COMAR DATABASE

➔ Comar Database

What can we do for you?

There are many Certified Reference Materials (CRMs) operated worldwide. You will find a large share of them in our database. Try and browse our database, it is free to use. Found a suitable material? Please contact its provider directly for further info.

Want to learn more about us?
Please read our intro:

➔ [About COMAR](#)

Quick help for your query

Searching in the COMAR database is easy, if you understand how it works. The basics are:
Start | Go to the COMAR database.

Register | We require your registration to understand whom we reach. It's quick and easy.

Search | Make any selection. Click the button [+]. If there is no [+], click the button "Apply filter".

Logical operators | You'll see A / N / O. They mean: AND, NOT, OR.

Help | Please read our helpfile. The basics are simple.

⬇ [COMAR helpfile](#)

OVERVIEW REFERENCE MATERIALS

RM NEWS

RM CERTIFICATES, REPORTS +

COMAR DATABASE +

CONTACT DIPL.-ING. RITA PRADEL

Division 1.4

Richard-Willstätter-Straße 11
12489 Berlin

Phone: +49 30 8104-5862

Email: rita.pradel@bam.de

CERTIFIED REFERENCE MATERIALS ABOUT COMAR

HOME > REFERENCE MATERIALS > COMAR DATABASE > ABOUT

COMAR helps you find a suitable certified reference material (CRM) for your laboratory. For a large number of materials offered worldwide we have produced data sheets and collected them in the COMAR database. You can browse and search the database at no cost. What is not included in the database are reference materials that come without a certificate.

Our history

The Code d'Indexation des Matériaux de Référence or COMAR was the name of a database produced by the French Laboratoire National d'Essais (LNE) in the late 1970s. The database was presented to the ISO Committee on Reference Materials (ISO-REMCO), which encouraged its use as the basis for an international information system on CRMs. A formal cooperation between LNE, NPL (United Kingdom) and BAM (Germany) was then established with the aim of improving and propagating the database. By the mid 1980s, the COMAR database contained about 3000 CRMs.

Until 1990, four new participating organizations had followed and the time had come to formalize the cooperation on the basis of a Memorandum of Understanding (MoU). The secretariat was provided by LNE until 1998 and from then on by BAM. Originally, COMAR was sold on floppy disc and updated once a year. Since 2003, updates are made continuously, and the database is free on internet. Currently it is planned to join forces with a very similar database for PT schemes called EPTIS (www.eptis.org). Initial preparations for this cooperation, including a complete software overhaul have already started.

Membership

Each participating economy has one coding centre responsible for data entry and maintenance. RM producers can contact them for inclusion of their CRMs in the COMAR database, or any other matter concerning COMAR. Coding centres for other countries have not yet been appointed. If you are a national institute and wish to take part in the COMAR network for your country we kindly invite you to apply for participation. The terms and conditions of our cooperation are laid down in our Memorandum of Understanding (MoU) which has been agreed by all partners. There are no financial obligations. Please contact the secretariat if you need any further details.

OVERVIEW REFERENCE MATERIALS

RM NEWS

RM CERTIFICATES, REPORTS +

COMAR DATABASE -

About

Who we are

Submit your CRM

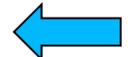
Database Login



How to Register & Login COMAR

CERTIFIED REFERENCE MATERIALS COMAR DATABASE

HOME > REFERENCE MATERIALS > COMAR DATABASE > DATABASE LOGIN

[COMAR Database Login](#) 

OVERVIEW REFERENCE
MATERIALS

RM NEWS

RM CERTIFICATES, REPORTS +

COMAR DATABASE -

Sign Up

User

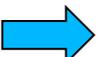
Email

Select your preferred language. English 

Password

Retype password

Comment

you can sign up
It is free of charge 

Welcome to the COMAR database. Please login (existing user) or sign up (new user) - free of charge.

User

Password

User: Trial
Password: 123456

<https://www.comar.bam.de/home/login.php>

COMAR Database Filters for Search



Startpage isleyen guest

COMAR VERSION 2.37

COMAR

CRM Name/ Description	Search by CRM name, catalogue number or in the field description
Physical Property	Search by physical properties
Conventional Property	Search by standardized properties
Fields of Application	Search by fields of application
CRM Form	Search by form of material
Composition	Search by content of molecules and elements

COMAR Startpage CRM Name/ Description Physical Property Conventional Property

Number of CRMs found: 1924

- Isotopic amount ratio (86 Sr) / (84 Sr) (other)
- Isotopic amount ratio (87 Sr) / (84 Sr) (other)
- Isotopic amount ratio (88 Sr) / (84 Sr) (other)
- Isotopic ratio delta value - 11B (other)
- Isotopic ratio delta value - 13C (other)
- Isotopic ratio delta value - 15N (other)
- Isotopic ratio delta value - 18O (other)
- Isotopic ratio delta value - 2H (other)
- Isotopic ratio delta value - 34S (other)
- Kinematic viscosity (3-24)
- Length (1-3.1)
- Linear expansion coefficient (4-3.1)
- Luminous flux (6-30)
- Luminous intensity (6-29)
- Magnetic induction (5-19)
- Mass (3-1)
- Mass concentration of substance B (8-11.2)
- Mass fraction of B (8-12)
- Melting point (°C) (other)
- Melting point (K) (other)
- Molar heat capacity (8-8)
- Molar mass (8-5)
- Mole fraction of B (8-14.1)
- Particle size (other)
- pH (8-C)
- Pressure (3-15)
- Reflection factor (7-27.2)
- Refractive index (6-44)
- Relative intensity (x-ray diffraction) (other)
- Relative permittivity (5-11)

COMAR Database Filters for Search



Startpage	CRM Name/ Description	Physical Property	Conventional Property
Number of CRMs found: 488			
Compatible fluides with elastomeres · AFNOR NF E-48610 Compressive strength · JIS R 5201-1997 Consistometric index * MOONEY degree · AFNOR NF T-43005 content (total) · - C-reactive protein solution · - Creep rate at 400 h · AFNOR NF A 03-355 Creep rate at 400 h · BS 3500 Creep rate at 400 h · DIN 50 118 (1982) Creep rate at 400 h · ISO R203/204 Critical coating failure load (Lc1) in scratch test · EN 1071-3:2005 Critical coating failure load (Lc2) in scratch test · EN 1071-3:2005 Critical coating failure load (Lc3) in scratch test · EN 1071-3:2005 Critical radiant flux (flooring) · ASTM E648-78 Critical radiant flux (flooring) · NFPA 253-1978 Crude ash · Directive 71/250/EEC Crude fibre · Directive 92/89/EEC Crude oils and fats · Directive 94/64/ECC Crude protein · Derective 93/28/EEC Dietary fibre · AOAC 1990 Dietary fibre · AOAC 1992 MES-TRIS Dietary fibre · Englyst colorimetry Dietary fibre · Englyst gas chromat. Dietary fibre · Uppsala Diglyceride content · EN 14105:2011 DNA amount · - DNA concentration · - DNA copy number concentration of plasmid · - DNA copy number ratio · - DNA fragment length · - DNA quantity · -			

COMAR Startpage CRM Name/ Description Physical Property Conventional Property **Fields of Application**

Number of CRMs found: 10393

<input type="checkbox"/> Country <input type="checkbox"/> Producer	Biological and Clinical Ferrous Industries Inorganics Non Ferrous Organics Physical Properties Quality of Life	<input type="button" value="Apply Filter"/> <input type="button" value="Show Results"/>
---	---	---

COMAR Startpage CRM Name/ Description Physical Property Conventional Property Fields of Application **CRM Form**

Number of CRMs found: 10393

<input type="checkbox"/> Country <input type="checkbox"/> Producer	artifacts chips, granules crystals, monocrystals and bicrystals cylinders, mushrooms, plates, discs gas ingots, rough globules, bars and wires liquid miscellaneous pellets powder solid	<input type="button" value="Apply Filter"/> <input type="button" value="Show Results"/>
---	--	---

COMAR Database Composition Filter

COMAR Startpage CRM Name/ Description Physical Property Conventional Property Fields of Application CRM Form **Composition**

Number of CRMs found: 36

Element [+]

A	N	O	Element	Unit	min	max	..
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	As	µg/g			[-]
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	Pb	µg/kg			[-]
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	Cd	µg/kg			[-]

Molecule / CAS_No.

Main Application [+]

A	N	O	Description	..
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>		[-]

Form [+]

A	N	O	Form	..
<input checked="" type="radio"/>	<input type="radio"/>	<input type="radio"/>	liquid	[-]

Country

- AUSTRALIA
- BELGIUM
- CANADA
- CZECH-REPUBLIC
- GERMANY
- JAPAN
- TURKEY
- UNITED STATES OF AMERIC
- UNITED-KINGDOM

Producer

Number of results: 1 Page: 1 of 1

Previous Next Print Preview Back to Selection Page

1	CRM Name	Status	Year	Country	Validity
	UME CRM 1201	available	2013	TURKEY	2018

Producer TÜBİTAK UME (National Metrology Institute)/Reference Materials Laboratory

Elements in Spring Water
This material is intended to be used for method validation of the determination of element mass fractions in spring waters and quality control purposes.
The material is in a HDPE plastic bottle containing about 100 mL of spring water. The material should be stored at (18 ± 4) °C in dark.

Fields of Application
Quality of Life
----Environment
Inorganics
----other Inorganic RM

Number of results: 1 Page: 1 of 1

Previous Next Print Preview Back to Selection Page

Clear Search



AOAC TDRM Database



Meetings | About AOAC | eOMA | Login | Enter Search... Q

Scientific Solutions | Membership | News and Pubs | Get Involved | Resources

Technical Division on Reference Materials

<https://www.aoac.org/membership/tdrm/>

The Technical Division on Reference Materials (TDRM) focuses on improving the quality of analytical measurements through the correct use of reference materials in methods validation.

The Technical Division on Reference Materials (TDRM) recommends policy and criteria to facilitate development and use of reference materials in validation, implementation, and use of AOAC methods.

Members have the opportunity to work collaboratively with each other, stay up to date on the availability of reference materials, attend the annual meeting of the Technical Division, and participate in round robin projects.

The AOAC® Technical Division on Reference Materials database provides easy access to data on reference materials based on analyte or analyte/matrix information meeting the needs of the analyst.

Annual Meetings of the TDRM membership are held during the AOAC INTERNATIONAL Annual Meeting & Exposition. The Technical Division on Reference Materials Executive Committee meets more frequently. TDRM publishes a quarterly newsletter that is emailed to all TDRM members.

Activities include organization and sponsorship of topical conferences and symposia, including the International Symposium on Biological and Environmental Reference Materials (BERM).

TDRM maintains close liaison with the Official Methods Board (and possible other method governing bodies) and the Laboratory Quality Assurance Committee within AOAC INTERNATIONAL to address issues and policies on reference materials in AOAC Programs.

TDRM sponsors two awards, a Student Award raising awareness of the need for method performance evaluation at an early point in a chemist's career, and the TDRM Award, recognizing contributions of members.

To join a Technical Division, you must be a current Individual, Student, or Organizational member with AOAC. Log into your membership profile page, add the Technical Division you are interested to your cart, and check out. Fees are:

- Technical Division on Reference Materials (TDRM): \$20 USD annually

Related Links

[AOAC membership](#)

[Technical Divisions overview](#)

[Technical Division on Reference Materials \(TDRM\)](#)

[Technical Division for Laboratory Management \(TDLM\)](#)

[Technical Division awards](#)

[Technical Division news](#)

Take Action

[Join a Technical Division - members](#)

[Join a Technical Division - nonmembers](#)

[Check membership status](#)

[Submit a student award nomination](#)

[Access TDRM reference database](#)



AOAC INTERNATIONAL The Scientific Association Dedicated to Analytical Excellence **TDRM** TECHNICAL DIVISION ON REFERENCE MATERIALS

Reference Material Search
[Return to TDRM Page](#)
[User Response](#)

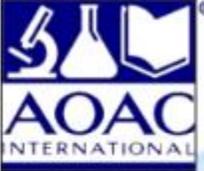
Search by Matrix

Search by Analyte

Search by OMA Method

<http://tdrmdb.aoac.org/>

AOAC TDRM Database

 The Scientific Association
Dedicated to
Analytical Excellence

 TDRM
TECHNICAL DIVISION ON
REFERENCE MATERIALS

Reference Material Search
Return to TDRM Page
User Response

Select Analyte First:

Then Select Matrix Class:

- Packaging | Packaging material, fibrous
- Packaging | Polymeric material
- Pet Product | Insecticide
- Pet Product | Pet Food
- Pet Product | Pharmaceutical formulation
- Petroleum material | Coal or Coke
- Petroleum material | Fuel or solvent**
- Petroleum material | Lubricant
- Petroleum material | Petroleum material
- Physical Measurement Calibration | Physical measurement calibration
- Purified material | Genetic material
- Purified material | Pure standard, inorganic
- Purified material | Pure standard, organic
- Purified material | Purified analyte
- Purified material | Reference solution (includes calibration solutions)
- Sanitation | Sanitation product
- Textile material | Textile material
- Tobacco or Inhalant product | Tobacco product
- Voice Print Identification | Voice Print Identification
- Weapons or Explosives | Weapons or Explosives

<http://tdrmdb.aoac.org/>

AOAC TDRM Database



Reference Material Search
Return to TDRM Page
User Response

To locate possible matching reference materials CHOOSE ONE of the options from the 'Select Method by' drop down list.

When there are multiple approved matrices and/or multiple analytes, the method will appear more than once in the options displayed. When

CHOOSE the method/analyte/approved matrix combination and press "View Possible Matches".

Select Method by:

Enter a unique search string,
one or more letters of the analyte name.

Please check at least one row and try again.

Select	OMA Method Number	Method Description	Analyte ID	Analyte Name	Matrix Class	Method Link
<input type="checkbox"/>	948.24	Lead in Color Additives	69	Lead (Pb)	Color agent	View Site
<input type="checkbox"/>	948.25	Lead in Color Additives	69	Lead (Pb)	Color agent	View Site
<input type="checkbox"/>	972.23	Lead in Fish	69	Lead (Pb)	Fish or Marine product	View Site
<input type="checkbox"/>	972.24	Lead in Fish	69	Lead (Pb)	Fish or Marine product	View Site
<input type="checkbox"/>	972.25	Lead in Food	69	Lead (Pb)	Food product	View Site
<input type="checkbox"/>	973.32	Lead and Cadmium Extracted from Ceramicware	69	Lead (Pb)	Ceramicware or Glass	View Site
<input type="checkbox"/>	973.35	Lead in Evaporated Milk	69	Lead (Pb)	Dairy, Liquid	View Site
<input type="checkbox"/>	973.82	Lead and Cadmium Extracted from Ceramicware	69	Lead (Pb)	Ceramicware or Glass	View Site
<input type="checkbox"/>	974.02	Lead in Paint	69	Lead (Pb)	Coating	View Site
<input type="checkbox"/>	974.13	Lead in Evaporated Milk	69	Lead (Pb)	Dairy, Liquid	View Site

OMA Details: [36](#) [1](#) [2](#) [3](#) [4](#)

Note: In order to see the details of methods, you have to subscribed to OMA online

<http://tdrmdb.aoac.org/>

NIST (USA) STANDARD REFERENCE MATERIALS

The screenshot shows the NIST Standard Reference Materials website. At the top, there is a search bar and a menu icon. Below the header, a blue banner reads "STANDARD REFERENCE MATERIALS" and includes a quote: "NIST supports accurate and compatible measurements by certifying and providing over 1200 Standard Reference Materials® with well-characterized composition or properties, or both." A left sidebar contains navigation links such as "About NIST SRMs", "Ordering Policies and Pricing", "Registration and Surveys", "SRM Order Request System", "Using the Online Catalog", "SRM Exhibits", "SRM Definitions", "Publications (SP260s)", "Archived SRM/RM Certificates/Reports of Investigation", "SRM Spotlight Newsletter", and "Standard Reference Instruments". The main content area features three image-based links: "Order SRMs Online" (with a peanut butter jar), "NIST SRM Licensed Distributors" (with a Gulf of Mexico Crude Oil bottle), and "SRM Frequently Asked Questions" (with a tray of SRMs). Below these is a search section with "SRM/RM Number:" and "KEYWORD(S):" input fields, each with a "Go" button. A note below the search fields states: "NOTE: If you have problems with the SRM search feature, click here for instructions on how to upgrade your browser settings." A link "Browse SRMs by Technical Category" is highlighted with a red arrow pointing to it. At the bottom, there is a "NEWS" section with two articles: "NIST Standard Story: No Humans Were Harmed" (dated February 15, 2017) and "NIST Standard Story: A Fish Story" (dated November 18, 2016).

The screenshot shows the "Standard Reference Materials SRM Online Request System" page. The header includes the NIST logo and "National Institute of Standards and Technology". A navigation bar contains links for "Login", "My Account", "View Cart", and "Checkout". A red banner at the top of the main content area reads "*** Updated SRM Shipping Information 4/3/2020 ***". The page is divided into two main columns. The left column, titled "Search for Materials", contains two search forms: one for "SRM/RM Number:" and another for "Keywords:". Below these is a "Browse the ORS" section with links for "ORS Home", "SRM Home", "Price List", and "Archived Certificates". The right column, titled "SRM Order Request System", contains a paragraph explaining the system and a "Browse Materials" section. This section lists various material categories with links: "Engineering Materials" (with sub-links for "Sizing", "Fire Research", and "Miscellaneous Performance Engineering Materials"); "Physical Properties" (with sub-links for "Ion Activity", "Thermodynamic Properties", "Radioactivity", "Metrology", and "X-Ray Diffraction"); "Chemical Composition" (with sub-links for "Ferrous Metals", "Microanalysis", "Health and Industrial Hygiene", "Primary Gas Mixtures", "Organics", "Geological Materials and Ores", "Cement", and "Forensics"); and a list of other categories: "Surface Finish", "Nanomaterials", "Polymeric Properties", "Optical Properties", "Electrical Properties", "Liquids and Glasses", "Nonferrous Metal", "High Purity Materials", "Inorganics", "Fossil and Alternative Fuels", "Food and Agriculture", "Ceramics and Glasses", and "Engine Wear Materials". A red arrow points to the "Fossil and Alternative Fuels" link.

<https://www.nist.gov/srm>

EC-JRC REFERENCE MATERIALS



JOINT RESEARCH CENTRE

Certified reference materials catalogue

Legal notice | Cookies | Contact | Search | English (en) ▾

Shopping cart

Home About us Frequently asked questions Legal notice My account/login Contact us

European Commission > JRC Science Hub > Knowledge > Reference and Measurement > Reference Materials

Home

How to order

Search tips

Catalogue/price list (pdf)

Accreditation

Certificate revisions

How to read our certificates

User support / Application Notes

Development of GMO CRMs

News

Welcome to the Certified Reference Materials catalogue of the JRC

This is the online catalogue for certified reference materials of the European Commission's Joint Research Centre (JRC). On this catalogue, you find the more than 800 CRMs of the BCR- and IRMM-brand as well as the ERM-branded materials that were produced by the JRC.



Latest News

- 2.3.2022: New CRMs for quantification of DP202216 maize released: [ERM-BF444a](#) and [ERM-BF444b](#). Read more in our [News](#) section

Search CRMs

 Find

Browse CRMs

- By application field
 - Industry and engineering
 - Environment
 - Food and feed**
 - Clinical and health
 - Microbiology
 - Neutron dosimetry
 - Nuclear
 - Stable isotopes
- By analyte group
- By material/matrix

<https://crm.jrc.ec.europa.eu/>

TUBITAK UME REFERENCE MATERIALS



REFERENCE MATERIALS



MAIN PAGE

ABOUT

SERVICES

QUALITY

HELP



RM LIST

ALL PRODUCTS

CRM LIST



Ref. Material Production
TS EN ISO 17034

AB-0001-RM

Accredited RM Producer
since 2016

CRM RESULT EVALUATION APPLICATION



Turkish Accreditation Agency (TÜRKAK) is a signatory to the European co-operation for Accreditation (EA) Multilateral Agreement (MLA) in the scope of ISO 17034.

<https://rm.ume.tubitak.gov.tr/en>



TUBITAK UME ENERGY & FUEL RMs

REFERENCE  MATERIALS

ENERGY and FUEL 

<https://rm.ume.tubitak.gov.tr/en>



UME CRM 1504
Benzoic Acid



UME RM 9927
Coal



UME RM 9914
Gasoline-National Marker
Compatibility Test Material



UME RM 9913
Bioethanol-National Marker
Compatibility Test Material



UME RM 9901
Total Contamination in Diesel



UME CRM 1502
Multiparameters in Diesel



UME CRM 1501
Multiparameters in Diesel



UME CRM 1203-2
Sulfur in Diesel



UME CRM 1203-1
Sulfur in Diesel

TUBITAK UME CRM DOCUMENTS



TÜBİTAK
ULUSAL METROLOJİ ENSTİTÜSÜ
Certificate of the Reference Material



Accreditation
symbol

Page 1 / 5

Name of the Material : Multiparameter in Diesel
Material Code : UME CRM 1502
Issue Date : 18.05.2016
Revision Date : 18.09.2019 (Revision history can be found on the last page)
Validity Period of the Certificate : One year from the sales date **Validity**
Certified Values :

Parameter	Certified Value ^[5]	Uncertainty ^[6]
Cetane Index ^[1]	56.8	1.6
Flash Point ^[2] (°C)	61.9	3.1
Kinematic Viscosity at 40 °C ^[3] (mm ² /s)	3.081	0.019
Density at 15 °C ^[4] (kg/m ³)	832.09	0.09

Certified Values
& Uncertainties

- [1] As defined by the measurement method/procedure specified in the EN ISO 4264 standard.
[2] As defined by the measurement method/procedure specified in the EN ISO 2719 standard.
[3] As defined by the measurement method/procedure specified in the EN ISO 3104/T1 standard.
[4] As defined by the measurement method/procedure specified in the EN ISO 12185 standard.
[5] Calculated from the unweighted mean of the accepted results submitted by different laboratories. The certified values (excluding cetane index) are traceable to the International System of Units (SI).
[6] The expanded uncertainty of certified value includes characterization, homogeneity, stability components and is stated as the standard uncertainty of measurement multiplied by the coverage factor k=2, which for a normal distribution corresponds to a coverage probability of approximately 95%. The standard uncertainty of measurement has been determined in accordance with GUM "Guide to the Expression of Uncertainty in Measurement".

Methods

Traceability

Uncertainty

TÜBİTAK UME, as a reference material producer, has been accredited by TÜRKAK according to TS EN ISO 17034 with the accreditation number AB-0001-RM.

Accreditation
status

Sales /
Shipment
Date

Sales Date

M. Çetintaş
Dr. Mustafa ÇETİNTAŞ
Director

The following pages are an integral part of the certificate. The use of current certificate is customers' responsibility.
Most recent certificate can be downloaded from www.ume.tubitak.gov.tr.

TÜBİTAK Gebze Yerleşkesi PK:54 41470 Gebze-Kocaeli/TÜRKİYE T +90 262 679 50 00 F +90 262 679 50 01 www.ume.tubitak.gov.tr

<https://rm.ume.tubitak.gov.tr/en>



REFERENCE MATERIALS



MAIN PAGE

ABOUT

SERVICES

QUALITY

HELP

Material Code	UME CRM 1502
Definition	Cetane index, flash point, kinematic viscosity (at 40 °C) and density (at 15 °C) and distillation parameters in diesel
Sales Unit	Amber glass bottle
The Net Amount	500 mL
Storage Conditions	(20 ± 4) °C
Product Documents	Certificate Certificate Report
Availability	In stock
Price	180 USD

Multiparameters in Diesel



ADD TO CART

biofMET

CRM CERTIFICATE

following pages of certificate

<https://rm.ume.tubitak.gov.tr/en>



Page 2 / 5	TÜBİTAK ULUSAL METROLOJİ ENSTİTÜSÜ NATIONAL METROLOGY INSTITUTE	UME CRM 1502
------------	---	-------------------------------

Certified Values (Continued):

Parameter	Certified Value ^[2]	Uncertainty ^[3]
Recovery at 250 °C (%)	27.0	2.4
Recovery at 350 °C (%)	93.8	2.1
5 % Recovery Temperature (°C)	191.3	12.9
10 % Recovery Temperature (°C)	209.4	7.9
20 % Recovery Temperature (°C)	235.9	9.8
30 % Recovery Temperature (°C)	255.5	5.4
40 % Recovery Temperature (°C)	270.9	2.8
50 % Recovery Temperature (°C)	283.5	3.3
60 % Recovery Temperature (°C)	295.2	2.5
70 % Recovery Temperature (°C)	307.1	3.9
80 % Recovery Temperature (°C)	320.8	3.3
90 % Recovery Temperature (°C)	339.8	5.1
95 % Recovery Temperature (°C)	354.4	4.6

- [1] As defined by the measurement method/procedure specified in EN ISO 3405 standard.
[2] Calculated from the unweighted mean of the accepted results submitted by different laboratories. The certified values are traceable to the International System of Units (SI).
[3] The expanded uncertainty of certified value includes characterization, homogeneity, long term stability components and is stated as the standard uncertainty of measurement multiplied by the coverage factor $k = 2$, which for a normal distribution corresponds to a coverage probability of approximately 95 %. The standard measurement uncertainty has been determined in accordance with GUM "Guide to the Expression of Uncertainty in Measurement".

Informative Values

Parameter	Value ^[1]
Cold Filter Plugging Point (CFPP) (°C)	-5.6

- [1] The value was calculated from the mean of ten laboratory results each obtained from two independent measurement results on two units.

Description

The material is about 500 mL of diesel in an amber glass bottle.

The use of current certificate is customers' responsibility. Most recent certificate can be downloaded from www.ume.tubitak.gov.tr

Certified Values & Uncertainties continued



can **not be** used for **traceability** or **trueness** control as certified values!



Intended Use

This material is intended to be used for method development, method validation, verification and quality control purposes for the measurement of cetane index, flash point, kinematic viscosity (at 40 °C), density (at 15 °C) and distillation (recovery at 250 °C, recovery at 350 °C and temperatures to obtain 5, 10, 20, 30, 40, 50, 60, 70, 80, 90, 95 % recovery) parameters.



Instructions for Use

EN ISO 3104/T1, EN ISO 12185, EN ISO 3405, EN ISO 4264 and EN ISO 2719 standard methods must be used for the determination of kinematic viscosity (at 40 °C), density (at 15 °C), distillation, cetane index and flash point, respectively. Measurements must be carried out on sample amounts indicated in the standard methods. The material can be safely dispatched at ambient temperature where the temperature does not exceed 50 °C and the transportation period of 4 weeks.



Storage Conditions

The material should be stored at (20 ± 4) °C, in a dark and clean environment. TÜBİTAK UME cannot be held responsible for changes that might happen to the material at customer's premises due to noncompliance of the instructions for use, and the storage conditions given in the certificate.



Safety Information

Material contains diesel. It is strongly recommended that the material must be handled and disposed according to the safety guidelines where applicable. All safety precautions, e.g. working in a fume hood and or using suitable masks, must be taken. All precautions for flammable materials are also valid for this material. Please refer to the Safety Datasheet before any use of the material.

CRM CERTIFICATE

following pages of certificate

<https://rm.ume.tubitak.gov.tr/en>



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Participants

Information about the laboratories participated in the characterization study are given in the following table.

Laboratory	Address
TÜBİTAK UME	TÜBİTAK Gebze Yerleşkesi, Barış Mahallesi, Dr. Zeki Acar Caddesi No.1, 41470 Gebze - Kocaeli / Türkiye
İnönü Üniversitesi Petrol Araştırma Laboratuvarı (PAL)	İnönü Üniversitesi Mühendislik Fakültesi Kimya Mühendisliği Bölümü 44280 Malatya/ TURKEY
KTÜ-YUAM	Karadeniz Teknik Üniversitesi Prof. Dr. Saadettin Güner Yakıt Uygulama Araştırma Merkezi 61080 Trabzon/ TURKEY
OMV POAŞ-İzmir	İzmir Aliağa Terminal Müdürlüğü Siteler Mah. Petrol Ofisi Cad. No: 10 35800 Aliağa - İzmir/ TURKEY
OMV-POAŞ- Haramidere	Haramidere Terminali Avcılar - İstanbul/ TURKEY
OPET-MARLAB	Merkez Mah. Ereğli Cad. No:78 Sultanköy Marmara Ereğlisi - Tekirdağ/ TURKEY
OPET-MERLAB	Karaduvar Mah. 1031 Sok. No:4 Mersin/ TURKEY
OPET-KORLAB	Güney Mah. Hamit Kaptan Sok No:8 41780 Körfez - Kocaeli/ TURKEY
TÜBİTAK MAM Enerji Enstitüsü	TÜBİTAK Gebze Yerleşkesi Barış Mah. Dr. Zeki Acar Cad. No.1 41470 Gebze - Kocaeli/ TURKEY
TÜPRAŞ İzmir Rafinerisi	Atatürk Mah. İnönü Bulvarı No: 52 35800 Aliağa - İzmir/ TURKEY
TÜPRAŞ İzmit Rafinerisi	Güney Mah. Petrol Cad. No: 25/1 41780 Körfez - Kocaeli/ TURKEY

Labs who
performed
value assignment
measurements



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Methods and/or Techniques Used for the Determination of the Certified Values

Information about the methods and/or techniques are given in below.

Method/Technique	Parameter
EN ISO 4264	Cetane Index
EN ISO 2719	Flash point
EN ISO 3104/T1	Kinematic Viscosity
EN ISO 12185	Density
EN ISO 3405	Distillation

← Methods

Revision History

Date	Remarks
18.05.2016	First Issue
08.11.2018	Certificate was updated due to format change of the document. The uncertainty values of distillation parameters, recovery at 250 °C and temperature of 30% and 90% recovery was updated. The significant digit of some certified and uncertainty values was revised.
18.09.2019	Information about shipping conditions is added. Certificate is updated due to changes in the format of certificate for reference materials.

← Revisions

CRM CERTIFICATION REPORT



TÜBİTAK
ULUSAL METROLOJİ ENSTİTÜSÜ

Certification Report

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Detailed Processing Information

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MATERIAL PROCESSING

The first step in the processing of the multiparameter in diesel reference material is the cleaning of the 300 L high density polyethylene homogenization tank, filtering equipment and 0.5 L amber glass bottles and their plastic caps. The homogenization tank was first cleaned with detergent and then rinsed with tap water and followed by high purity water (Milli-Q, 18.2 M Ω ·cm⁻¹) and dried. The filtering equipment and 0.5 L amber glass bottles and their plastic caps were also cleaned first with detergent and then they were rinsed with tap water and high purity water (Milli-Q, 18.2 M Ω ·cm⁻¹) and dried at 40 °C in a conventional oven equipped with hepa filter. Drying of the tank, filtering equipment and 0.5 L amber glass bottles and their plastic caps were completed in five days.

Raw diesel material was obtained from TÜPRAŞ İzmit Petroleum Refinery. Diesel was filtered through 0.45 μ m pore size filter (Whatman, 10370019 GF 6) and filled into 300 L high-density polyethylene tank. Material was homogenized by circulating with repetitive pouring and filling of the content. After homogenization, diesel sample was filled into cleaned and dried bottles as approximately 0.5 L. Total 528 units were labeled according to the filling order and placed into the reference temperature +4 °C storage room.

Multiparameter in Diesel
UME CRM 1502

Report Prepared By

Burcu Binici
Sema Akyürek
Ümit Yüksel Akçadağ
Orhan Sakarya

Interlab. Comp. Study for Characterization

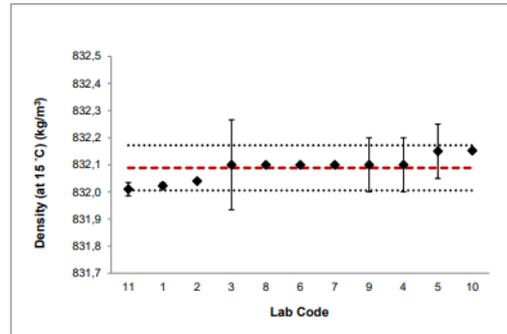


Figure 85. UME CRM 1502, Density (at 15 °C), Characterisation

Homogeneity

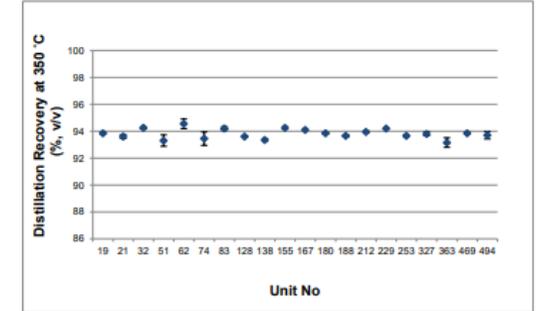


Figure 2. UME CRM 1502 Distillation, Recovery at 350 °C, Homogeneity

Stability

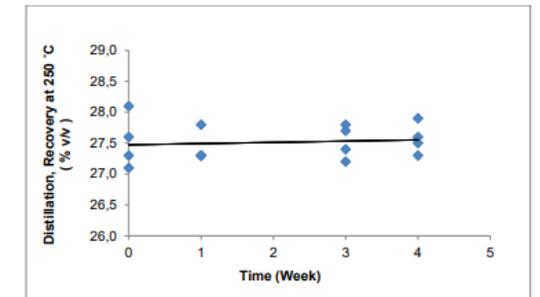


Figure 18. UME CRM 1502, Distillation, Recovery at 250 °C, Short Term stability at +20 °C

Date
08.11.2018

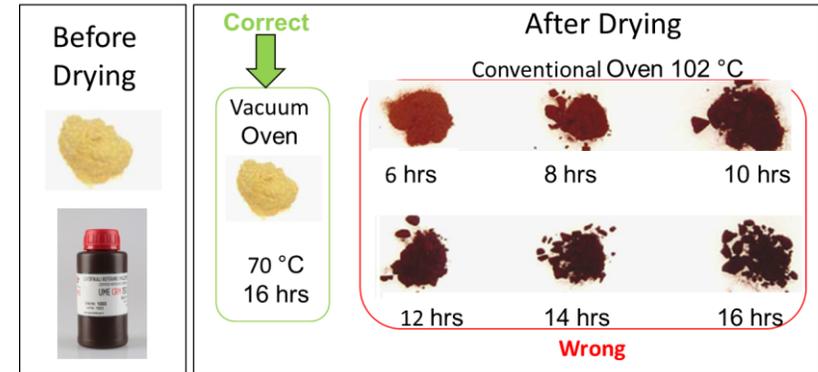
M. Çetintaş
Dr. Mustafa ÇETİNTAŞ
Director



Storage and Handling of RMs

CHECK BEFORE USING a RM!

- Check Complete Delivery (Shipping Temperature, Any Leak?)
- Check Instructions for Storage
- Check Instructions for Use (Pretreatment, Rehomogenisation, Reconstitution, Minimum Sample Intake)
- Check Dry Mass Correction Instructions (if applicable)
- Check Subsampling and storage instructions for further use (avoid contamination & water uptake)
Be careful: do not open a frozen bottle before equilibrating with ambient temperature!
- Check disposal instructions (SDS document, spillage, expiration)



Instructions should be strictly followed!
Sample amount, Temperature, Duration, Vacuum

Read certificate, certification report, Labels, SDS for further important instructions!



DATABASES, PRODUCERS, USEFUL LINKS

Databases:

COMAR	www.comar.bam.de
AOAC	http://tdrmdb.aoac.org/
Geological RMs	http://georem.mpch-mainz.gwdg.de/
Clinical CRMs	http://www.bipm.org/jctlm/
Key Comparisons	https://www.bipm.org/kcdb/



CERTIFIED REFERENCE MATERIALS
COMAR DATABASE



Some RM Produces and Distributors:

NIST	https://www.nist.gov/srm
EC-JRC-IRMM	https://crm.jrc.ec.europa.eu/
BAM	https://www.bam.de
IAEA	https://nucleus.iaea.org/rpst
NMIJ	https://unit.aist.go.jp/nmij/english/
KRISS	www.kriss.re.kr/eng
NRC	https://nrc.canada.ca/en/certifications-evaluations-standards/certified-reference-materials
NMIA	https://shop.measurement.gov.au/collections/reference-materials
TUBITAK UME	https://rm.ume.tubitak.gov.tr/en
LGC	www.lgcstandards.com
Sigma-Aldrich	www.sigmaaldrich.com



Useful Links:

<https://crm.jrc.ec.europa.eu/e/132/User-support-Application-Notes>





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Thank You

METROLOGY SHAPES the FUTURE

2022

SI

kg, m, s, A, K, mol, Cd

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