Key comparison CCQM-K55.c

MEASURAND : Mass fraction of Valine in the CCQM-K55.c samples

x_i **:** result of measurement carried out by laboratory *i*

u_i **:** combined standard uncertainty of x_i

	x_i / (mg/g)	u_i / (mg/g)
BAM	991.22	0.16
BIPM	993.2	+0.18, -0.70
CENAM	990.095	56.38
GL	992.9	2.5
HSA	992.1	1.6
INMETRO	984.9	0.85
IRMM	990.9	0.6
KRISS	992	0.34
LGC	992.7	2.3
LNE	992.95	0.85
NIM	990.9	1.14
NIMT	994.25	0.46
NIST	990.0	0.9
NMIA	985	2
NMIJ	992.6	0.51
NMISA	988.9	3.3
NRC	987	3.4
SIRIM	993.0	1.5
UME	979.2	1.84
VNIIM	990.47	0.18

Key comparison CCQM-K55.c

MEASURAND : Mass fraction of Related Structure Impurities in the CCQM-K55.c samples

x_i : result of measurement carried out by laboratory *i*

u_i : combined standard uncertainty of x_i

Lab *i*	x_i / (mg/g)	u_i / (mg/g)
BAM	9.13	0.14
BIPM	6.8	+0.61, -0.11
CENAM	9.68	0.47
GL	6.97	2.07
HSA	7.16	0.09
INMETRO	13.81	0.45
IRMM	7.02	0.54
KRISS	8.02	0.057
LGC	7.12	2
LNE	6.58	0.11
NIM	7.97	0.52
NIMT	5.46	0.14
NIST	8.00	0.5
NMIJ	7.58	0.34
NMISA	7.67	0.93
UME	20.30	0.133
VNIIM	7.61	0.17

Key comparison CCQM-K55.c

MEASURAND : Mass fraction of Water in the CCQM-K55.c samples

x_i **:** result of measurement carried out by laboratory *i*

u_i **:** combined standard uncertainty of x_i

Lab *i*	x_i / (mg/g)	u_i / (mg/g)
BAM	0.06	0.02
BIPM	0	+0.14, -0
CENAM	0.222	0.0016
GL	0.12	0.03
HSA	0.72	0.25
INMETRO	0.2	+0, -0.058
IRMM	2.47	0.37
KRISS	0	+0.28, -0
LGC	0.15	0.06
LNE	0.069	0.019
NIM	0.27	0.025
NIMT	0.28	0.20
NIST	0.16	0.04
NMIJ	0.062	0.020
NMISA	0.64	0.11
NRC	7.65	0.57
UME	0.35	0.0192
VNIIM	1.84	0.04

Key comparison CCQM-K55.c

MEASURAND : Mass fraction of Volatile Organic Content in the CCQM-K55.c samples

x_i **:** result of measurement carried out by laboratory *i*

u_i **:** combined standard uncertainty of x_i

Lab *i*	x_i / (mg/g)	u_i / (mg/g)
BAM	0.1	+0, -0.1
BIPM	0	+0.1, -0
GL	0	+1, -0
HSA	0	+0.58, -0
IRMM	0	+0.16, -0
KRISS	0	+0.02, -0
LGC	0	+1.1, -0
LNE	0	+0.82, -0
NIM	0.021	0.011
NIMT	0.01	+0.3, -0
NIST	0.16	0.03
NMIJ	0.0017	0.0007
NMISA	0	+0.75, -0
VNIIM	0.02	+0.1, -0

Key comparison CCQM-K55.c

MEASURAND : Mass fraction of Non-Volatile Content in the CCQM-K55.c samples

x_i **:** result of measurement carried out by laboratory *i*

u_i **:** combined standard uncertainty of x_i

Lab *i*	x_i / (mg/g)	u_i / (mg/g)
BAM	0	+0.28, -0
BIPM	0	+0.28, -0
CENAM	0.00253	0.00007
GL	0	+1, -0
HSA	0	+1.44, -0
INMETRO	1.3	0.72
IRMM	0.12	0.12
KRISS	0	+0.19, -0
LGC	0	+0.28, -0
LNE	0.4	0.1
NIM	0.19	0.09
NIMT	0.5	0.25
NIST	0.37	0.12
NMIA	0	+1.15, -0
NMIJ	0	+0.18, -0
NMISA	2.8	1.16
UME	2.05	0.0009
VNIIM	0.083	0.02

Key comparison CCQM-K55.c

MEASURAND : Mass Fraction of Valine in the CCQM-K55.c samples

The key comparison reference value for the mass fraction of valine x_R, was calculated by substraction from the limit value of 1000 mg/g of the summation of the individual estimates for each contributing class of impurities present in CCQM-K55.c, as explained in page 23 of the Final Report. Its standard uncertainty, u_R, is computed by combination in quadrature of the uncertainties associated with each contributing impurity estimate and also uncertainties in the inter-unit homogeneity of related substance impurity content.

x_R = 992.0 mg/g, u_R = 0.3 mg/g

MEASURAND : Mass fraction of individual impurity classes in the CCQM-K55.c samples

Key comparison reference values (x_R) and associated standard uncertainty (u_R) were assigned for the mass fraction of each orthogonal impurity class - related substances, water, volatile organics and non-volatiles - quantified by the participants in CCQM-K55.c who used a mass balance approach to assign the valine content. They are consensus values derived from the individual data supplied by each participant. The assignment method varied by impurity class and each is separately described on pages 11 to page 18 of the Final Report.

For Total Related Substance Impurities: x_R = 7.60 mg/g, u_R = 0.24 mg/g

For Water: x_R = 0.155 mg/g, u_R = 0.042 mg/g

For Volatile Organics: x_R = 0.0 mg/g, u_R = + 0.12 mg/g , - 0.0 mg/g

For Non-Volatiles: x_R = 0.25 mg/g, u_R = 0.144 mg/g

The degree of equivalence of laboratory *i* with respect to each key comparison reference value is given by a pair of terms, both expressed in mg/g: $D_i = (x_i - x_R)$ and its expanded uncertainty ($k = 2$), $U_i = 2(u_R^2 + u_i^2)^{1/2}$

No pair-wise degrees of equivalence have been computed for this key comparison.

Key comparison CCQM-K55.c

Degrees of equivalence for Mass fraction of Valine

Lab *i* ⇩

	D_i / (mg/g)	U_i / (mg/g)
BAM	**-0.80**	0.66
BIPM	**1.20**	+0.70, -1.52
CENAM	**-1.90**	112.76
GL	**0.90**	5.03
HSA	**0.10**	3.25
INMETRO	**-7.10**	1.80
IRMM	**-1.10**	1.33
KRISS	**0.00**	0.89
LGC	**0.70**	4.64
LNE	**0.95**	1.80
NIM	**-1.10**	2.35
NIMT	**2.25**	1.09
NIST	**-2.00**	1.89
NMIA	**-7.00**	4.04
NMIJ	**0.60**	1.17
NMISA	**-3.10**	6.63
NRC	**-5.00**	6.82
SIRIM	**1.00**	3.06
UME	**-12.80**	3.73
VNIIM	**-1.50**	0.68

Key comparison CCQM-K55.c

Degrees of equivalence for Related Structure Impurities

Lab *i* ⇩	D_i / (mg/g)	U_i / (mg/g)
BAM	**1.54**	0.55
BIPM	**-0.80**	+1.31, -0.53
CENAM	**2.09**	1.05
GL	**-0.63**	4.17
HSA	**-0.44**	0.51
INMETRO	**6.22**	1.02
IRMM	**-0.58**	1.18
KRISS	**0.43**	0.49
LGC	**-0.48**	4.03
LNE	**-1.02**	0.52
NIM	**0.37**	1.14
NIMT	**-2.14**	0.55
NIST	**0.40**	1.11
NMIJ	**-0.02**	0.83
NMISA	**0.07**	1.92
UME	**12.71**	0.54
VNIIM	**0.01**	0.59

Degrees of equivalence for Water

Lab *i* ⇩	D_i / (mg/g)	U_i / (mg/g)
BAM	**-0.10**	0.093
BIPM	**-0.16**	+0.292, -0.084
CENAM	**0.07**	0.084
GL	**-0.04**	0.103
HSA	**0.57**	0.507
INMETRO	**0.05**	+0.084,- 0.143
IRMM	**2.32**	0.745
KRISS	**-0.16**	+0.566, -0.084
LGC	**-0.01**	0.146
LNE	**-0.09**	0.092
NIM	**0.12**	0.098
NIMT	**0.13**	0.409
NIST	**0.01**	0.116
NMIJ	**-0.10**	0.093
NMISA	**0.49**	0.235
NRC	**7.50**	1.143
UME	**0.20**	0.092
VNIIM	**1.69**	0.116

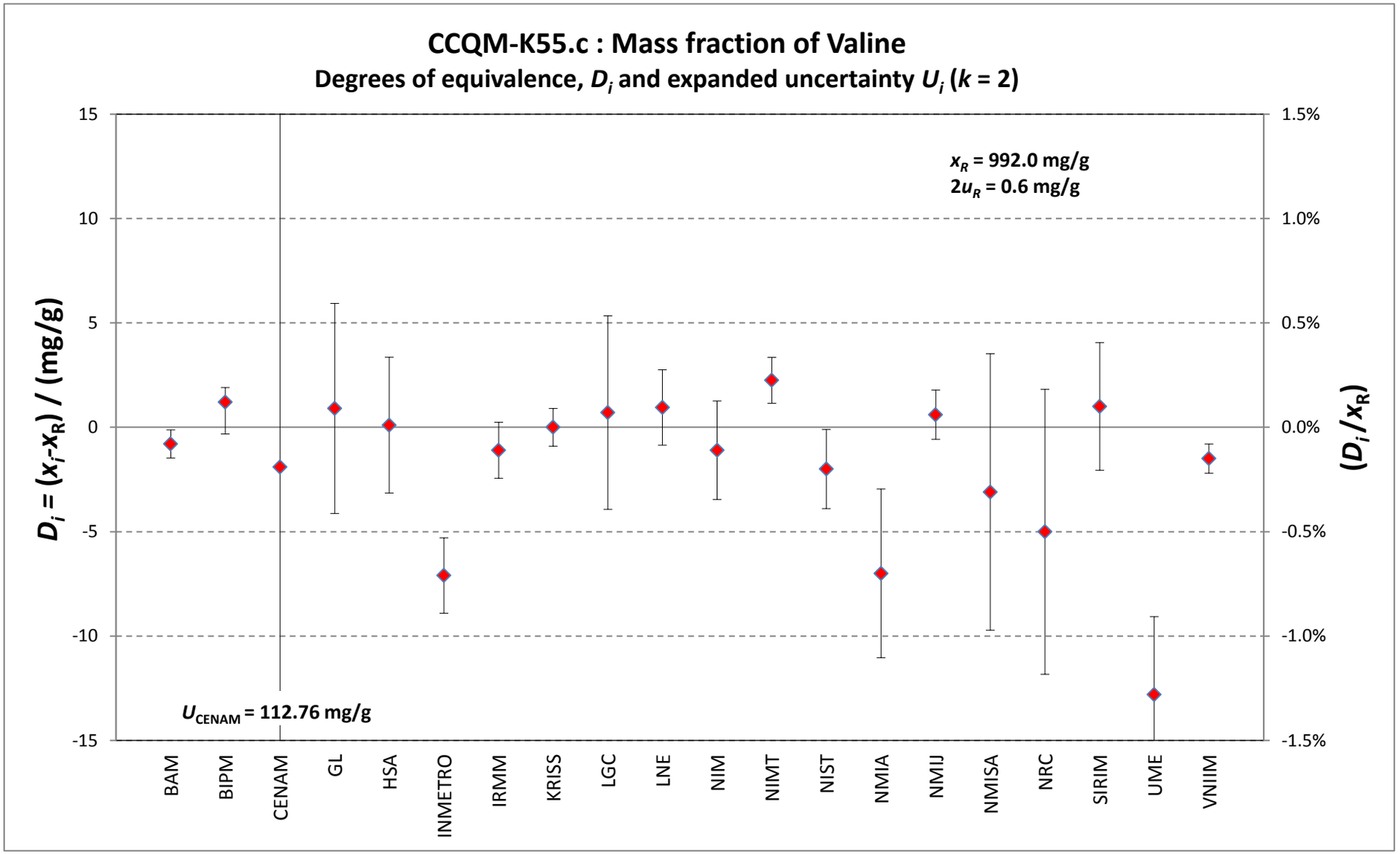
Key comparison CCQM-K55.c

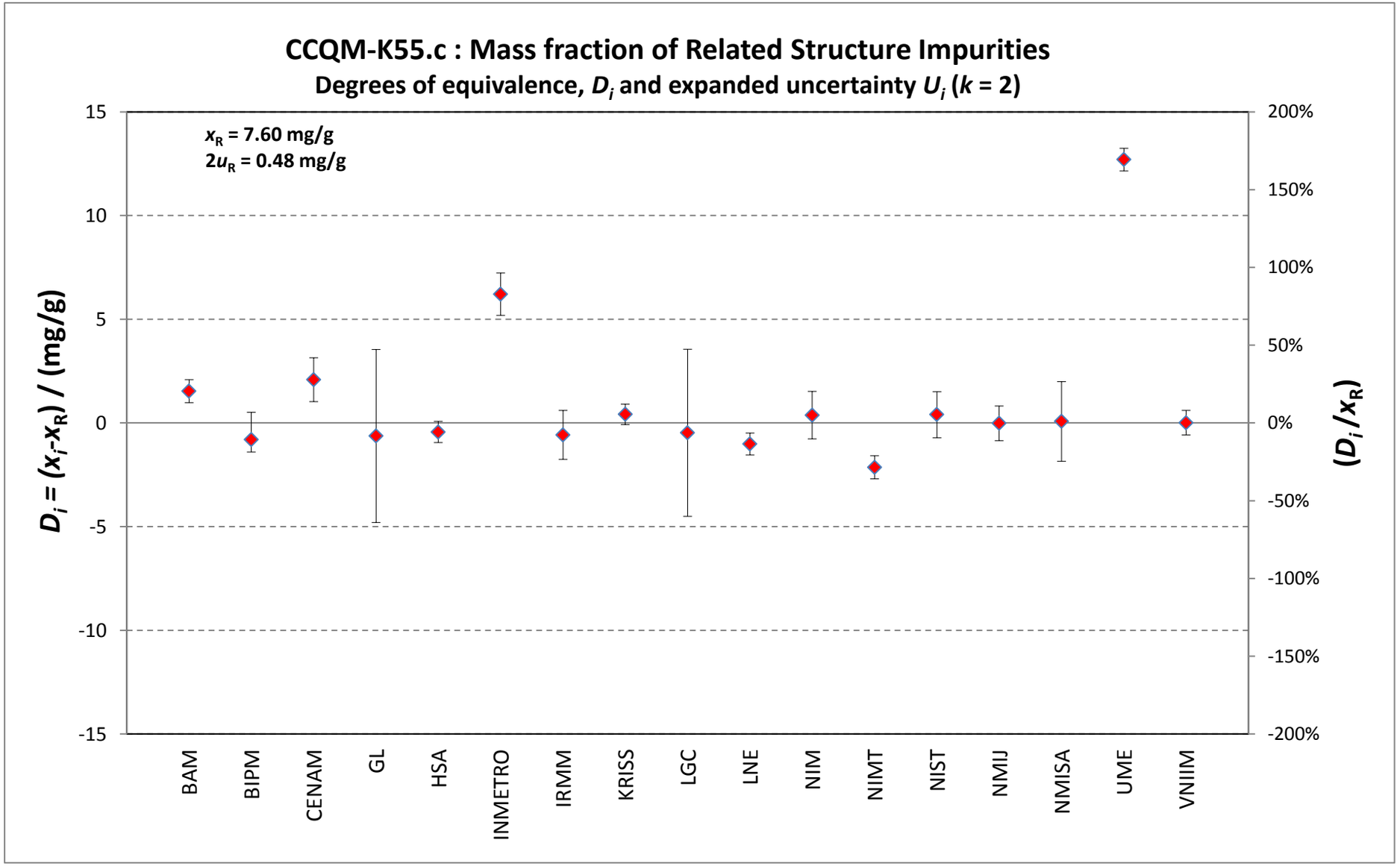
Degrees of equivalence for Volatile Organics

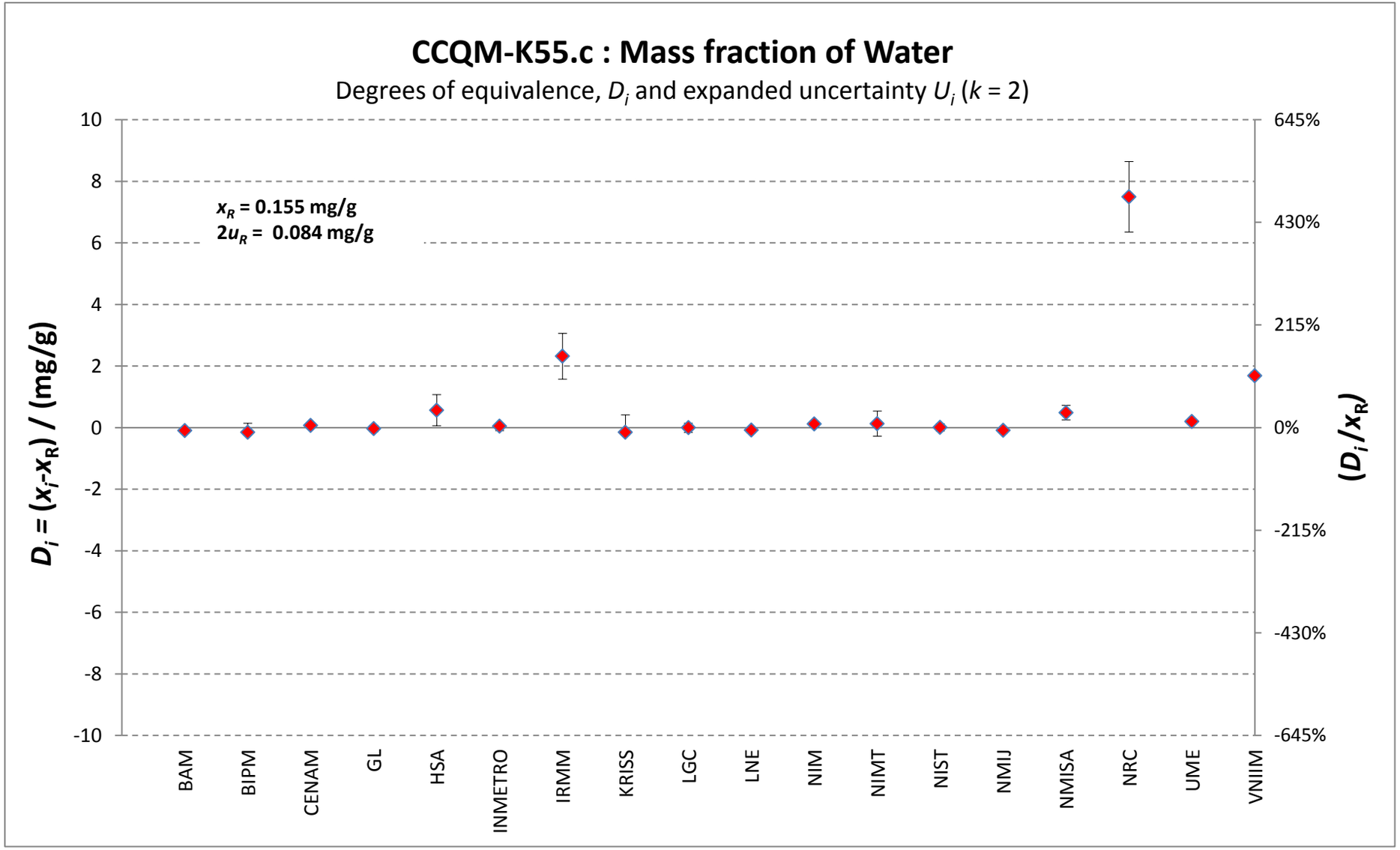
Lab *i* ⇩	D_i / (mg/g)	U_i / (mg/g)
BAM	**0.10**	+0.24, -0.20
BIPM	**0.00**	+0.31, -0.0
GL	**0.00**	+2.01, -0.0
HSA	**0.00**	+1.18, -0.0
IRMM	**0.00**	+0.40, -0.0
KRISS	**0.00**	+0.24, -0.0
LGC	**0.00**	+2.21, 0.0
LNE	**0.00**	+1.66, -0.0
NIM	**0.02**	+0.23, -0.02
NIMT	**0.01**	+0.64, -0.0
NIST	**0.16**	+0.24, -0.06
NMIJ	**0.00**	+0.23, -0.0
NMISA	**0.00**	+1.52, -0.0
VNIIM	**0.02**	+0.31, -0.0

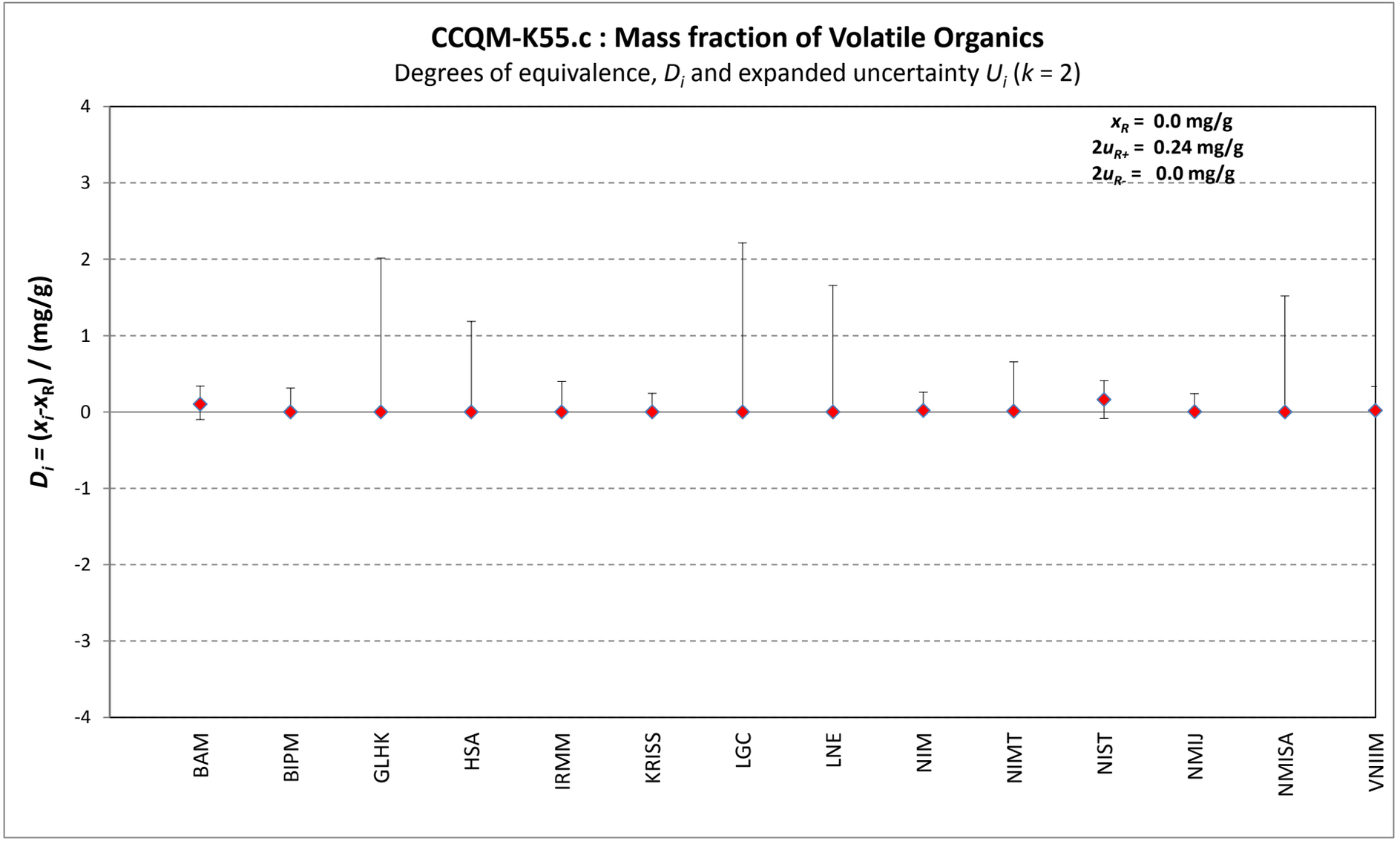
Degrees of equivalence for Non-Volatiles

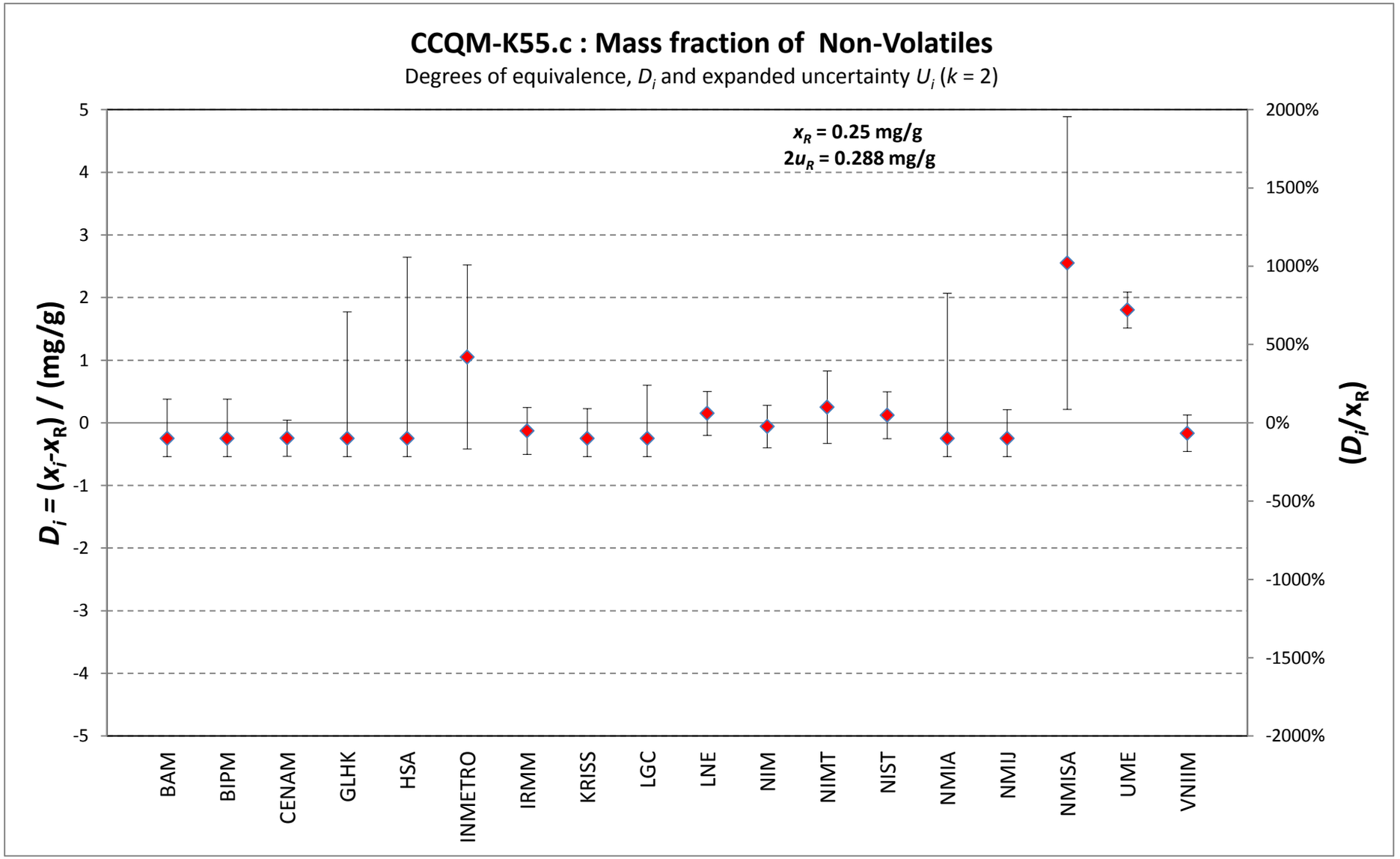
Lab *i* ⇩	D_i / (mg/g)	U_i / (mg/g)
BAM	**-0.25**	+0.63, -0.29
BIPM	**-0.25**	+0.63, -0.29
CENAM	**-0.25**	0.29
GL	**-0.25**	+2.02, -0.29
HSA	**-0.25**	+2.89, -0.29
INMETRO	**1.05**	1.47
IRMM	**-0.13**	0.37
KRISS	**-0.25**	+0.48, -0.29
LGC	**-0.25**	+0.63, -0.29
LNE	**0.15**	0.35
NIM	**-0.06**	0.34
NIMT	**0.25**	0.58
NIST	**0.12**	0.37
NMIA	**-0.25**	+2.32, -0.29
NMIJ	**-0.25**	+0.46, -0.29
NMISA	**2.55**	2.34
UME	**1.80**	0.29
VNIIM	**-0.17**	0.29


CCQM-K55.c : Mass fraction of Valine
Degrees of equivalence, D_i and expanded uncertainty U_i (k = 2)
x_R = 992.0 mg/g
$2u_R$ = 0.6 mg/g
U_{CENAM} = 112.76 mg/g
$D_i = (x_i - x_R)$ / (mg/g)
(D_i / x_R)
15
10
5
0
-5
-10
-15
1.5%
1.0%
0.5%
0.0%
-0.5%
-1.0%
-1.5%
BAM
BIPM
CENAM
GL
HSA
INMETRO
IRMM
KRISS
LGC
LNE
NIM
NIMT
NIST
NMIA
NMIJ
NMISA
NRC
SIRIM
UME
VNIIM


CCQM-K55.c : Mass fraction of Related Structure Impurities
Degrees of equivalence, D_i and expanded uncertainty U_i (k = 2)
x_R = 7.60 mg/g
$2u_R$ = 0.48 mg/g
$D_i = (x_i - x_R)$ / (mg/g)
(D_i/x_R)
15
10
5
0
-5
-10
-15
200%
150%
100%
50%
0%
-50%
-100%
-150%
-200%
BAM
BIPM
CENAM
GL
HSA
INMETRO
IRMM
KRISS
LGC
LNE
NIM
NIMT
NIST
NMIJ
NMISA
UME
VNIIM


CCQM-K55.c : Mass fraction of Water
Degrees of equivalence, D_i and expanded uncertainty U_i (k = 2)
x_R = 0.155 mg/g
$2u_R$ = 0.084 mg/g
$D_i = (x_i - x_R)$ / (mg/g)
(D_i / x_R)
10
8
6
4
2
0
-2
-4
-6
-8
-10
645%
430%
215%
0%
-215%
-430%
-645%
BAM
BIPM
CENAM
GL
HSA
INMETRO
IRMM
KRISS
LGC
LNE
NIM
NIMT
NIST
NMIJ
NMISA
NRC
UME
VNIIIM


CCQM-K55.c : Mass fraction of Volatile Organics
Degrees of equivalence, D_i and expanded uncertainty U_i (k = 2)
x_R = 0.0 mg/g
$2u_{R+}$ = 0.24 mg/g
$2u_{R-}$ = 0.0 mg/g
$D_i = (x_i - x_R)$ / (mg/g)
4
3
2
1
0
-1
-2
-3
-4
BAM
BIPM
GLHK
HSA
IRMM
KRISS
LGC
LNE
NIM
NIMT
NIST
NMIJ
NMISA
VNIIM


CCQM-K55.c : Mass fraction of Non-Volatiles
Degrees of equivalence, D_i and expanded uncertainty U_i (k = 2)
x_R = 0.25 mg/g
$2u_R$ = 0.288 mg/g
$D_i = (x_i - x_R)$ / (mg/g)
(D_i/x_R)
5
4
3
2
1
0
-1
-2
-3
-4
-5
2000%
1500%
1000%
500%
0%
-500%
-1000%
-1500%
-2000%
BAM
BIPM
CENAM
GLHK
HSA
INMETRO
IRMM
KRISS
LGC
LNE
NIM
NIMT
NIST
NMIA
NMIJ
NMISA
UME
VNIIM