



**EUROPEAN COMMISSION  
Directorate General  
Joint Research Centre**

**Directorate F – Health, Consumers and Reference Materials**

# **CERTIFIED REFERENCE MATERIALS 2020**

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## INTRODUCTION

Public confidence in measurement results is important in many aspects of modern society, including consumer protection in food consumption, health-care, environmental protection, and fair trade. Certified Reference Materials (CRMs) are cornerstones of modern analytical quality assurance because they allow calibration of instruments, validation of methods, and quality control of methods and laboratories based on traceability and comparability of measurement results.

The JRC-Geel provides

**IRMM certified reference materials**, produced by the EC-JRC

**BCR<sup>®</sup> certified reference materials** (BCR<sup>®</sup> is a registered trademark of the EC), for which production was supported by research funding of the European Commission, DG Research

**ERM<sup>®</sup> certified reference materials** (ERM<sup>®</sup> is a registered trademark of the EC), a brand launched in 2003 for CRMs of the highest quality

and

**EURM<sup>®</sup> certified reference materials**, produced by the EC-JRC-Geel

These CRMs are produced according to specific Guidelines of the European Commission which are in agreement with the relevant ISO Guides 34 and 35. The JRC-Geel has been accredited for the production of reference materials since 2004 (accreditation certificate BELAC 268-RM)

## **Certificates**

Certificates carry a certified value with its uncertainty which is traceable either to a SI unit or an internationally accepted reference. The intended use for each CRM is stated on the certificate. CRMs are stored under controlled conditions which ensure their stability. Monitoring programmes have been set up to control CRM stability during the whole shelf-life.

At present JRC-Geel's Reference Materials Unit offers about 700 different CRMs. A complete list of these CRMs, including description and price as well as the CRM catalogue and all certificates and certification reports can be accessed directly via the online catalogue:

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

To order a free hardcopy of the catalogue simply write to:

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## Availability

As CRMs should become regularly used items in any measurement laboratory, JRC-Geel's Reference Materials Unit continues its effort to supply CRMs in sufficient amount to cover market needs. However, in exceptional cases where only limited amounts are available, it reserves the right to restrict and/or refuse orders. The reference materials contained in this catalogue are made available world-wide through the JRC-Geel's Reference Materials Unit and its authorised distributors.

They can be purchased from the

European Commission  
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Reference Materials Unit  
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[jrc-rm-distribution@ec.europa.eu](mailto:jrc-rm-distribution@ec.europa.eu)

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If samples are purchased through **UNAUTHORISED COMPANIES**, the JRC-Geel cannot be held responsible for the integrity of the materials (especially in case of potentially unstable materials) nor, for the accuracy and/or completeness of the accompanying information (certificates, reports, etc.).

# 1 MATERIALS RELATED TO ENVIRONMENTAL ANALYSIS

## 1.1 PURE MATERIALS AND SYNTHETIC MIXTURES

	Substance	Purity (g/g)		
	<b>Polycyclic aromatic compounds</b>			
<b>BCR-046</b>	BENZO[b]CHRYSENE	0.994	+	0.006
			-	0.008
<b>BCR-047</b>	BENZO[b]FLUORANTHENE	0.997 4	±	0.002 6
<b>BCR-048R</b>	BENZO[k]FLUORANTHENE (unit size 10 mg)	0.997	+	0.003
			-	0.004
<b>BCR-049</b>	BENZO[j]FLUORANTHENE	0.997	±	0.003
			±	0.006
<b>BCR-050</b>	BENZO[e]PYRENE	0.991	+	0.009
			-	0.010
<b>BCR-052</b>	BENZO[ghi]PERYLENE	0.992 3	±	0.002 1
<b>BCR-077R</b>	1-METHYLCHRYSENE (unit size 10 mg)	0.991	±	0.007
<b>BCR-078R</b>	2-METHYLCHRYSENE (unit size 10 mg)	0.993	±	0.005
<b>BCR-079R</b>	3-METHYLCHRYSENE (unit size 10 mg)	0.993	±	0.005
<b>BCR-080R</b>	4-METHYLCHRYSENE (unit size 10 mg)	0.994	±	0.004
<b>BCR-081R</b>	5-METHYLCHRYSENE (unit size 10 mg)	0.997 3	±	0.001 3
<b>BCR-091</b>	ANTHANTHRENE	0.996	±	0.004
<b>BCR-092</b>	10-AZABENZO[a]PYRENE	0.996	±	0.006
<b>BCR-093R</b>	1-METHYLBENZ[a]ANTHRACENE (unit size 10 mg)	0.996	±	0.005
<b>BCR-094</b>	DIBENZ[a,c]ANTHRACENE	0.996	±	0.004
<b>BCR-095</b>	DIBENZ[a,j]ANTHRACENE	0.997 8	±	0.002 5
<b>BCR-096</b>	DIBENZO[a,l]PYRENE	0.997 2	±	0.002 5
<b>BCR-097</b>	BENZO[a]FLUORANTHENE	0.996	±	0.004
<b>BCR-133</b>	DIBENZO[a,e]PYRENE	0.996	+	0.004
			-	0.005
<b>BCR-134</b>	BENZO[c]PHENANTHRENE	0.996 8	±	0.001 4
<b>BCR-136R</b>	BENZO[b]NAPHTHO[2,3-d]THIOPHENE (unit size 10 mg)	0.994	±	0.006
<b>BCR-137R</b>	BENZO[b]NAPHTHO[1,2-d]THIOPHENE (unit size 10 mg)	0.996 6	±	0.002 9
<b>BCR-138</b>	DIBENZ[a,h]ANTHRACENE	0.990	±	0.007
<b>BCR-139</b>	BENZO[ghi]FLUORANTHENE	0.995	±	0.004
<b>BCR-140</b>	BENZO[c]CHRYSENE	0.996	+	0.004
			-	0.005
<b>BCR-153R</b>	DIBENZ[a,h]ACRIDINE (unit size 10 mg)	0.999 2	±	0.000 6
<b>BCR-154</b>	DIBENZ[a,j]ACRIDINE	0.999 0	+	0.000 7
			-	0.001 0
<b>BCR-155</b>	DIBENZ[a,c]ACRIDINE	0.999 1	+	0.000 7
			-	0.000 8
<b>BCR-156R</b>	DIBENZ[c,h]ACRIDINE (unit size 10 mg)	0.993 6	±	0.002 1
<b>BCR-157</b>	BENZ[a]ACRIDINE	0.998 2	±	0.001 8
<b>BCR-158</b>	BENZ[c]ACRIDINE	0.998 7	+	0.001 3
			-	0.001 8
<b>BCR-159</b>	DIBENZO[a,h]PYRENE	0.993	±	0.007
<b>BCR-160R</b>	FLUORANTHENE (unit size 10 mg)	0.996	+	0.004
			-	0.005
<b>BCR-168</b>	PICENE (unit size 10 mg)	0.998	+	0.001 3
			-	0.004
<b>BCR-177R</b>	PYRENE (unit size 10 mg)	0.998 0	±	0.000 4

Availability: Amber vials containing about 100 mg of powdered material unless otherwise specified.

	<b>Polycyclic aromatic compounds</b>			
<b>BCR-152</b>	DIBENZ[a,i]ACRIDINE	0.998 5	+	0.001 0
			-	0.000 8
<b>BCR-265</b>	DIBENZO[a,e]FLUORANTHENE	0.998 5	+	0.001 6
			-	0.001 0
<b>BCR-266</b>	7H-DIBENZO[c,g]CARBAZOLE	0.997 1	±	0.001 6
<b>BCR-267</b>	INDENO[1,2,3-cd]FLUORANTHENE	0.998 6	+	0.000 9
			-	0.000 8
<b>BCR-269</b>	CHRYSENE	0.992 8	±	0.002 8
<b>BCR-270</b>	TRIPHENYLENE	0.998 4	+	0.001 0
			-	0.000 6
<b>BCR-271</b>	BENZ[a]ANTHRACENE	0.998 4	±	0.000 9
<b>BCR-272</b>	CORONENE	0.998 9	+	0.000 6
			-	0.000 4

Availability: Amber vials containing about 20 mg of powdered material.

	<b>Polycyclic aromatic compounds</b>		
<b>ERM-AC051</b>	BENZO[A]PYRENE	0.979	± 0.007
<b>ERM-AC053</b>	INDENO[1,2,3-CD]PYRENE	0.996	+ 0.004
			- 0.005
<b>ERM-AC082</b>	6-METHYLCHRYSENE	0.983	+ 0.005

Availability: Brown glass vials containing about 25 mg of material.

	<b>Nitro-polycyclic aromatic hydrocarbons</b>		
<b>BCR-305</b>	1-NITROPYRENE	0.997 6	± 0.000 7
<b>BCR-306</b>	1-NITRONAPHTALENE	0.996 9	± 0.001 0
<b>BCR-307</b>	2-NITRONAPHTALENE	0.997 7	+ 0.000 9
			- 0.001 1
<b>BCR-308</b>	9-NITROANTHRACENE	0.997 5	± 0.001 0
<b>BCR-309</b>	6-NITROCHRYSENE	0.989	± 0.004
<b>BCR-310</b>	3-NITROFLUORANTHENE	0.996 8	+ 0.001 2
			- 0.002 1
<b>BCR-311</b>	6-NITROBENZO[a]PYRENE	0.997 8	+ 0.000 8
			- 0.001 0
<b>BCR-312</b>	2-NITRO-7-METHOXYNAPHTHO[2.1-b]FURAN	0.998 4	± 0.000 7

Availability: Amber vials containing about 10 mg of powdered material.

	<b>Oxygenated polycyclic aromatic hydrocarbons</b>		
<b>BCR-337</b>	DIBENZO[b,d]FURAN	0.987	± 0.007
<b>BCR-339</b>	6H-BENZO[c,d]PYREN-6-ONE	0.988	± 0.009
<b>BCR-340</b>	BENZO[b]NAPHTHO[1,2-d]FURAN	0.997	+ 0.003
			- 0.005
<b>BCR-341</b>	BENZO[b]NAPHTHO[2,1-d]FURAN	0.996	+ 0.004
			- 0.005
<b>BCR-342</b>	BENZO[a]FLUORENONE	0.997 9	+ 0.002 1
			- 0.002 2

Availability: Amber vials containing about 10 mg of powdered material.

	<b>Polychlorinated biphenyls</b>		
	IUPAC No.		
<b>BCR-289</b>	8                    2,4' - DICHLOROBIPHENYL	0.996 3	+ 0.005
			- 0.001 8
<b>BCR-290</b>	20                  2,3,3' - TRICHLOROBIPHENYL	0.998 5	± 0.001 3
<b>BCR-291</b>	28                  2,4,4' - TRICHLOROBIPHENYL	0.997 9	± 0.001 3
<b>BCR-293</b>	52                  2,2',5,5' - TETRACHLOROBIPHENYL	0.995 9	± 0.002 5
<b>BCR-296</b>	138                2,2',3,4,4',5' - HEXACHLOROBIPHENYL	0.999 2	± 0.000 7
<b>BCR-297</b>	153                2,2',4,4',5,5' - HEXACHLOROBIPHENYL	0.999 4	+ 0.000 9
			- 0.000 5
<b>BCR-298</b>	180                2,2',3,4,4',5,5' - HEPTACHLOROBIPHENYL	0.995 7	± 0.001 4

Availability: Amber vials containing about 25 mg of powdered material.

### Polychlorinated biphenyls in iso-octane (BCR-365)

IUPAC No.	Content in mg/kg	Concentration in g/m <sup>3</sup> at 25 °C <sup>1)</sup>
8	11.4 ± 0.4	(7.8 ± 0.2)
20	15.2 ± 0.9	(10.5 ± 0.7)
28	24.8 ± 1.1	(17.1 ± 0.8)
35	14.3 ± 0.8	(9.8 ± 0.5)
52	14.8 ± 0.6	(10.2 ± 0.4)
101	14.4 ± 0.6	(9.9 ± 0.4)
118	14.9 ± 0.8	(10.3 ± 0.6)
138	8.6 ± 0.6	(5.9 ± 0.5)
153	14.2 ± 0.6	(9.8 ± 0.4)
180	15.2 ± 0.6	(10.4 ± 0.3)

1) Not certified concentrations (g/m<sup>3</sup>) were calculated from the certified content assuming a density of iso-octane of 687.77 kg/m<sup>3</sup> at 25 °C.

Availability: Unit consisting of a pair of dark glass ampoules, each containing 2 cm<sup>3</sup> of 2,2,4-Trimethylpentane (iso-octane) sealed under nitrogen.

The pair of ampoules is supplied in a metal can which is packed with absorbent material.



## Polychlorodibenzo-p-dioxins (PCDDs) and polychlorodibenzofurans (PCDFs)

### BCR-614 SOLUTION – S0

Congener	Certified mass fraction <sup>1)</sup>	Uncertainty <sup>2)</sup>	Mass fraction expressed in concentration units <sup>3)</sup>	Uncertainty expressed in concentration units <sup>3)</sup>
	(µg/kg)	(µg/kg)	(µg/L)	(µg/L)
2,3,7,8-T <sub>4</sub> CDD	0.137	0.004	0.098 3	0.002 9
1,2,3,7,8-P <sub>5</sub> CDD	0.698	0.014	0.501	0.010
1,2,3,4,7,8-HCDD	0.688	0.021	0.494	0.015
1,2,3,6,7,8-HCDD	0.696	0.006	0.500	0.004
1,2,3,7,8,9-HCDD	0.705	0.008	0.506	0.006
1,2,3,4,6,7,8-HCDD	1.400	0.020	1.005	0.014
1,2,3,4,6,7,8,9-O <sub>8</sub> CDD	1.396	0.007	1.001	0.005
2,3,7,8-T <sub>4</sub> CDF	0.139 7	0.001 1	0.100 2	0.000 8
1,2,3,7,8-P <sub>5</sub> CDF	0.707	0.013	0.507	0.009
2,3,4,7,8-P <sub>5</sub> CDF	0.698	0.005	0.501	0.004
1,2,3,4,7,8-HCDF	0.700	0.006	0.502	0.005
1,2,3,6,7,8-HCDF	0.698	0.005	0.501	0.004
1,2,3,7,8,9-HCDF	0.699	0.009	0.502	0.007
2,3,4,6,7,8-HCDF	0.694	0.007	0.498	0.005
1,2,3,4,6,7,8-HCDF	1.396	0.008	1.001	0.006
1,2,3,4,7,8,9-HCDF	1.394	0.030	1.001	0.022
1,2,3,4,6,7,8,9-O <sub>8</sub> CDF	1.397	0.024	1.002	0.017

- 1) The certified mass fraction has been calculated from the purity of the individual PCDD/F compounds as assessed in a comprehensive study and the gravimetric preparation of the solution.
- 2) Uncertainties have been calculated by combining contributions from the purity study and the gravimetric preparation; details are given in the certification report.
- 3) Non-certified values.

### BCR-614 SOLUTION – S0

Congener	Certified mass fraction <sup>1)</sup>	Uncertainty <sup>2)</sup>	Mass fraction expressed in concentration units <sup>3)</sup>	Uncertainty expressed in concentration units <sup>3)</sup>
	(µg/kg)	(µg/kg)	(µg/L)	(µg/L)
<sup>13</sup> C-2,3,7,8-T <sub>4</sub> CDD	13.95	0.06	10.01	0.05
<sup>13</sup> C-1,2,3,7,8-P <sub>5</sub> CDD	13.9	0.4	10.00	0.23
<sup>13</sup> C-1,2,3,4,7,8-HCDD	13.98	0.07	10.03	0.05
<sup>13</sup> C-1,2,3,6,7,8-HCDD	13.94	0.24	10.00	0.17
<sup>13</sup> C-1,2,3,7,8,9-HCDD	13.95	0.10	10.01	0.07
<sup>13</sup> C-1,2,3,4,6,7,8-HCDD	27.9	0.6	20.0	0.4
<sup>13</sup> C-1,2,3,4,6,7,8,9-O <sub>8</sub> CDD	27.87	0.16	20.00	0.12
<sup>13</sup> C-2,3,7,8-T <sub>4</sub> CDF	13.96	0.09	10.02	0.07
<sup>13</sup> C-1,2,3,7,8-P <sub>5</sub> CDF	13.94	0.24	10.00	0.17
<sup>13</sup> C-2,3,4,7,8-P <sub>5</sub> CDF	13.95	0.06	10.01	0.05
<sup>13</sup> C-1,2,3,4,7,8-HCDF	13.90	0.07	9.97	0.05
<sup>13</sup> C-1,2,3,6,7,8-HCDF	13.93	0.10	10.00	0.08
<sup>13</sup> C-1,2,3,7,8,9-HCDF	13.93	0.10	10.00	0.07
<sup>13</sup> C-2,3,4,6,7,8-HCDF	13.93	0.09	10.00	0.06
<sup>13</sup> C-1,2,3,4,6,7,8-HCDF	27.92	0.20	20.03	0.15
<sup>13</sup> C-1,2,3,4,7,8,9-HCDF	27.87	0.24	20.00	0.17
<sup>13</sup> C-1,2,3,4,6,7,8,9-O <sub>8</sub> CDF	27.88	0.25	20.01	0.18
<sup>13</sup> C-1,2,3,4-T <sub>4</sub> CDD	13.94	0.08	10.00	0.06

BCR-614 SOLUTION – S1

Congener	Certified mass fraction <sup>1)</sup>	Uncertainty <sup>2)</sup>	Mass fraction expressed in concentration units <sup>3)</sup>	Uncertainty expressed in concentration units <sup>3)</sup>
	(µg/kg)	(µg/kg)	(µg/L)	(µg/L)
2,3,7,8-T <sub>4</sub> CDD	0.273	0.008	0.196	0.006
1,2,3,7,8-P <sub>5</sub> CDD	1.394	0.027	1.000	0.020
1,2,3,4,7,8-HCDD	1.37	0.05	0.986	0.030
1,2,3,6,7,8-HCDD	1.391	0.010	0.998	0.007
1,2,3,7,8,9-HCDD	1.408	0.015	1.011	0.011
1,2,3,4,6,7,8-HCDD	2.80	0.04	2.006	0.028
1,2,3,4,6,7,8,9-O <sub>8</sub> CDD	2.787	0.010	2.000	0.007
2,3,7,8-T <sub>4</sub> CDF	0.279 0	0.002 1	0.200 2	0.001 5
1,2,3,7,8-P <sub>5</sub> CDF	1.412	0.025	1.013	0.018
2,3,4,7,8-P <sub>5</sub> CDF	1.395	0.008	1.001	0.006
1,2,3,4,7,8-HCDF	1.398	0.011	1.003	0.008
1,2,3,6,7,8-HCDF	1.393	0.009	1.000	0.006
1,2,3,7,8,9-HCDF	1.397	0.017	1.002	0.012
2,3,4,6,7,8-HCDF	1.387	0.012	0.995	0.009
1,2,3,4,6,7,8-HCDF	2.787	0.012	2.000	0.009
1,2,3,4,7,8,9-HCDF	2.78	0.06	2.00	0.05
1,2,3,4,6,7,8,9-O <sub>8</sub> CDF	2.79	0.05	2.00	0.04
<sup>13</sup> C-2,3,7,8-T <sub>4</sub> CDD	13.95	0.06	10.01	0.05
<sup>13</sup> C-1,2,3,7,8-P <sub>5</sub> CDD	13.9	0.4	10.00	0.23
<sup>13</sup> C-1,2,3,4,7,8-HCDD	13.98	0.07	10.03	0.05
<sup>13</sup> C-1,2,3,6,7,8-HCDD	13.93	0.24	10.00	0.17
<sup>13</sup> C-1,2,3,7,8,9-HCDD	13.94	0.10	10.01	0.07
<sup>13</sup> C-1,2,3,4,6,7,8-HCDD	27.9	0.6	20.0	0.4
<sup>13</sup> C-1,2,3,4,6,7,8,9-O <sub>8</sub> CDD	27.86	0.16	19.99	0.11
<sup>13</sup> C-2,3,7,8-T <sub>4</sub> CDF	13.96	0.09	10.01	0.07
<sup>13</sup> C-1,2,3,7,8-P <sub>5</sub> CDF	13.93	0.24	10.00	0.17
<sup>13</sup> C-2,3,4,7,8-P <sub>5</sub> CDF	13.94	0.06	10.00	0.05
<sup>13</sup> C-1,2,3,4,7,8-HCDF	13.89	0.07	9.97	0.05
<sup>13</sup> C-1,2,3,6,7,8-HCDF	13.93	0.11	9.99	0.08
<sup>13</sup> C-1,2,3,7,8,9-HCDF	13.92	0.10	9.99	0.07
<sup>13</sup> C-2,3,4,6,7,8-HCDF	13.93	0.09	9.99	0.06
<sup>13</sup> C-1,2,3,4,6,7,8-HCDF	27.90	0.20	20.02	0.14
<sup>13</sup> C-1,2,3,4,7,8,9-HCDF	27.86	0.24	19.99	0.17
<sup>13</sup> C-1,2,3,4,6,7,8,9-O <sub>8</sub> CDF	27.87	0.25	20.00	0.18
<sup>13</sup> C-1,2,3,4-T <sub>4</sub> CDD	13.93	0.07	10.00	0.05

- 1) The certified mass fraction has been calculated from the purity of the individual PCDD/F compounds as assessed in a comprehensive study and the gravimetric preparation of the solution.
- 2) Uncertainties have been calculated by combining contributions from the purity study and the gravimetric preparation; details are given in the certification report.
- 3) Non-certified values.

BCR-614 SOLUTION – S2

Congener	Certified mass fraction <sup>1)</sup> Uncertainty <sup>2)</sup>		Mass fraction expressed in concentration units <sup>3)</sup>	
	(µg/kg)	(µg/kg)	(µg/L)	(µg/L)
2,3,7,8-T <sub>4</sub> CDD	1.09	0.04	0.785	0.023
1,2,3,7,8-P <sub>5</sub> CDD	5.57	0.11	4.00	0.08
1,2,3,4,7,8-HCDD	5.49	0.17	3.94	0.12
1,2,3,6,7,8-HCDD	5.56	0.04	3.992	0.027
1,2,3,7,8,9-HCDD	5.63	0.06	4.04	0.05
1,2,3,4,6,7,8-HCDD	11.18	0.16	8.02	0.11
1,2,3,4,6,7,8,9-O <sub>8</sub> CDD	11.15	0.04	8.000	0.027
2,3,7,8-T <sub>4</sub> CDF	1.116	0.008	0.801	0.006
1,2,3,7,8-P <sub>5</sub> CDF	5.65	0.10	4.05	0.07
2,3,4,7,8-P <sub>5</sub> CDF	5.58	0.03	4.004	0.022
1,2,3,4,7,8-HCDF	5.59	0.05	4.01	0.04
1,2,3,6,7,8-HCDF	5.57	0.04	3.999	0.024
1,2,3,7,8,9-HCDF	5.59	0.07	4.01	0.05
2,3,4,6,7,8-HCDF	5.55	0.05	3.98	0.04
1,2,3,4,6,7,8-HCDF	11.15	0.05	8.00	0.04
1,2,3,4,7,8,9-HCDF	11.14	0.24	7.99	0.17
1,2,3,4,6,7,8,9-O <sub>8</sub> CDF	11.16	0.19	8.01	0.14
<sup>13</sup> C-2,3,7,8-T <sub>4</sub> CDD	13.95	0.06	10.01	0.05
<sup>13</sup> C-1,2,3,7,8-P <sub>5</sub> CDD	13.9	0.4	10.00	0.23
<sup>13</sup> C-1,2,3,4,7,8-HCDD	13.98	0.07	10.03	0.05
<sup>13</sup> C-1,2,3,6,7,8-HCDD	13.93	0.24	10.00	0.17
<sup>13</sup> C-1,2,3,7,8,9-HCDD	13.94	0.10	10.01	0.07
<sup>13</sup> C-1,2,3,4,6,7,8-HCDD	27.9	0.6	20.0	0.4
<sup>13</sup> C-1,2,3,4,6,7,8,9-O <sub>8</sub> CDD	27.86	0.16	19.99	0.11
<sup>13</sup> C-2,3,7,8-T <sub>4</sub> CDF	13.96	0.09	10.01	0.07
<sup>13</sup> C-1,2,3,7,8-P <sub>5</sub> CDF	13.93	0.24	10.00	0.17
<sup>13</sup> C-2,3,4,7,8-P <sub>5</sub> CDF	13.94	0.06	10.00	0.05
<sup>13</sup> C-1,2,3,4,7,8-HCDF	13.89	0.07	9.97	0.05
<sup>13</sup> C-1,2,3,6,7,8-HCDF	13.93	0.11	9.99	0.08
<sup>13</sup> C-1,2,3,7,8,9-HCDF	13.93	0.10	9.99	0.07
<sup>13</sup> C-2,3,4,6,7,8-HCDF	13.93	0.09	9.99	0.06
<sup>13</sup> C-1,2,3,4,6,7,8-HCDF	27.90	0.20	20.02	0.15
<sup>13</sup> C-1,2,3,4,7,8,9-HCDF	27.86	0.24	19.99	0.17
<sup>13</sup> C-1,2,3,4,6,7,8,9-O <sub>8</sub> CDF	27.87	0.25	20.00	0.18
<sup>13</sup> C-1,2,3,4-T <sub>4</sub> CDD	13.93	0.08	10.00	0.06

- 1) The certified mass fraction has been calculated from the purity of the individual PCDD/F compounds as assessed in a comprehensive study and the gravimetric preparation of the solution.
- 2) Uncertainties have been calculated by combining contributions from the purity study and the gravimetric preparation; details are given in the certification report.
- 3) Non-certified values.

BCR-614 SOLUTION – S3

Congener	Certified mass fraction <sup>1)</sup> Uncertainty <sup>2)</sup>		Mass fraction expressed in concentration units <sup>3)</sup>	
	(µg/kg)	(µg/kg)	(µg/L)	(µg/L)
2,3,7,8-T <sub>4</sub> CDD	5.47	0.16	3.92	0.12
1,2,3,7,8-P <sub>5</sub> CDD	27.9	0.6	20.0	0.4
1,2,3,4,7,8-HCDD	27.5	0.9	19.7	0.6
1,2,3,6,7,8-HCDD	27.81	0.19	19.96	0.14
1,2,3,7,8,9-HCDD	28.17	0.30	20.21	0.21
1,2,3,4,6,7,8-HCDD	55.9	0.8	40.1	0.6
1,2,3,4,6,7,8,9-O <sub>8</sub> CDD	55.74	0.19	40.00	0.14
2,3,7,8-T <sub>4</sub> CDF	5.58	0.04	4.003	0.029
1,2,3,7,8-P <sub>5</sub> CDF	28.2	0.5	20.3	0.4
2,3,4,7,8-P <sub>5</sub> CDF	27.90	0.16	20.02	0.11
1,2,3,4,7,8-HCDF	27.96	0.22	20.06	0.16
1,2,3,6,7,8-HCDF	27.87	0.17	20.00	0.12
1,2,3,7,8,9-HCDF	27.9	0.4	20.04	0.24
2,3,4,6,7,8-HCDF	27.73	0.23	19.90	0.17
1,2,3,4,6,7,8-HCDF	55.74	0.24	40.00	0.17
1,2,3,4,7,8,9-HCDF	55.7	1.2	40.0	0.9
1,2,3,4,6,7,8,9-O <sub>8</sub> CDF	55.8	1.0	40.0	0.7
<sup>13</sup> C-2,3,7,8-T <sub>4</sub> CDD	13.95	0.06	10.01	0.05
<sup>13</sup> C-1,2,3,7,8-P <sub>5</sub> CDD	13.9	0.4	10.00	0.23
<sup>13</sup> C-1,2,3,4,7,8-HCDD	13.98	0.07	10.03	0.05
<sup>13</sup> C-1,2,3,6,7,8-HCDD	13.93	0.24	10.00	0.17
<sup>13</sup> C-1,2,3,7,8,9-HCDD	13.95	0.10	10.01	0.07
<sup>13</sup> C-1,2,3,4,6,7,8-HCDD	27.9	0.6	20.0	0.4
<sup>13</sup> C-1,2,3,4,6,7,8,9-O <sub>8</sub> CDD	27.87	0.16	20.00	0.11
<sup>13</sup> C-2,3,7,8-T <sub>4</sub> CDF	13.96	0.09	10.02	0.07
<sup>13</sup> C-1,2,3,7,8-P <sub>5</sub> CDF	13.93	0.24	10.00	0.17
<sup>13</sup> C-2,3,4,7,8-P <sub>5</sub> CDF	13.94	0.06	10.01	0.05
<sup>13</sup> C-1,2,3,4,7,8-HCDF	13.90	0.07	9.97	0.05
<sup>13</sup> C-1,2,3,6,7,8-HCDF	13.93	0.11	10.00	0.08
<sup>13</sup> C-1,2,3,7,8,9-HCDF	13.93	0.10	10.00	0.07
<sup>13</sup> C-2,3,4,6,7,8-HCDF	13.93	0.09	10.00	0.06
<sup>13</sup> C-1,2,3,4,6,7,8-HCDF	27.91	0.20	20.03	0.14
<sup>13</sup> C-1,2,3,4,7,8,9-HCDF	27.87	0.24	20.00	0.17
<sup>13</sup> C-1,2,3,4,6,7,8,9-O <sub>8</sub> CDF	27.88	0.25	20.00	0.18
<sup>13</sup> C-1,2,3,4-T <sub>4</sub> CDD	13.93	0.07	10.00	0.05

- 1) The certified mass fraction has been calculated from the purity of the individual PCDD/F compounds as assessed in a comprehensive study and the gravimetric preparation of the solution.
- 2) Uncertainties have been calculated by combining contributions from the purity study and the gravimetric preparation; details are given in the certification report.
- 3) Non-certified values.

BCR-614 SOLUTION – S4

Congener	Certified mass fraction <sup>1)</sup>	Uncertainty <sup>2)</sup>	Mass fraction expressed in concentration units <sup>3)</sup>	Uncertainty expressed in concentration units <sup>3)</sup>
	(µg/kg)	(µg/kg)	(µg/L)	(µg/L)
2,3,7,8-T <sub>4</sub> CDD	27.3	0.8	9.6	0.6
1,2,3,7,8-P <sub>5</sub> CDD	139.3	2.7	100.0	2.0
1,2,3,4,7,8-HCDD	137	5	98.6	3.0
1,2,3,6,7,8-HCDD	139.1	1.0	99.8	0.7
1,2,3,7,8,9-HCDD	140.8	1.5	101.1	1.1
1,2,3,4,6,7,8-HCDD	280	4	200.6	2.8
1,2,3,4,6,7,8,9-O <sub>8</sub> CDD	278.7	1.0	200.0	0.7
2,3,7,8-T <sub>4</sub> CDF	27.89	0.21	20.02	1.75
1,2,3,7,8-P <sub>5</sub> CDF	141.2	2.5	101.3	1.8
2,3,4,7,8-P <sub>5</sub> CDF	139.5	0.8	100.1	0.6
1,2,3,4,7,8-HCDF	139.8	1.1	100.3	0.8
1,2,3,6,7,8-HCDF	139.3	0.9	100.0	0.6
1,2,3,7,8,9-HCDF	139.6	1.7	100.2	1.2
2,3,4,6,7,8-HCDF	138.7	1.2	99.5	0.9
1,2,3,4,6,7,8-HCDF	278.7	1.2	200.0	0.9
1,2,3,4,7,8,9-HCDF	278	6	200	5
1,2,3,4,6,7,8,9-O <sub>8</sub> CDF	279	5	200	4
<sup>13</sup> C-2,3,7,8-T <sub>4</sub> CDD	13.95	0.06	10.01	0.05
<sup>13</sup> C-1,2,3,7,8-P <sub>5</sub> CDD	13.99	0.4	10.00	0.23
<sup>13</sup> C-1,2,3,4,7,8-HCDD	13.98	0.07	10.03	0.05
<sup>13</sup> C-1,2,3,6,7,8-HCDD	13.93	0.24	10.00	0.17
<sup>13</sup> C-1,2,3,7,8,9-HCDD	13.94	0.10	10.01	0.07
<sup>13</sup> C-1,2,3,4,6,7,8-HCDD	27.9	0.6	20.0	0.4
<sup>13</sup> C-1,2,3,4,6,7,8,9-O <sub>8</sub> CDD	27.86	0.16	19.99	0.11
<sup>13</sup> C-2,3,7,8-T <sub>4</sub> CDF	13.96	0.09	10.01	0.07
<sup>13</sup> C-1,2,3,7,8-P <sub>5</sub> CDF	13.93	0.24	10.00	0.17
<sup>13</sup> C-2,3,4,7,8-P <sub>5</sub> CDF	13.94	0.06	10.00	0.05
<sup>13</sup> C-1,2,3,4,7,8-HCDF	13.89	0.07	9.97	0.05
<sup>13</sup> C-1,2,3,6,7,8-HCDF	13.93	0.11	9.99	0.08
<sup>13</sup> C-1,2,3,7,8,9-HCDF	13.92	0.10	9.99	0.07
<sup>13</sup> C-2,3,4,6,7,8-HCDF	13.93	0.09	9.99	0.06
<sup>13</sup> C-1,2,3,4,6,7,8-HCDF	27.90	0.20	20.02	0.15
<sup>13</sup> C-1,2,3,4,7,8,9-HCDF	27.86	0.24	19.99	0.17
<sup>13</sup> C-1,2,3,4,6,7,8,9-O <sub>8</sub> CDF	27.87	0.25	20.00	0.18
<sup>13</sup> C-1,2,3,4-T <sub>4</sub> CDD	13.93	0.08	10.00	0.06

- 1) The certified mass fraction has been calculated from the purity of the individual PCDD/F compounds as assessed in a comprehensive study and the gravimetric preparation of the solution.
- 2) Uncertainties have been calculated by combining contributions from the purity study and the gravimetric preparation; details are given in the certification report.
- 3) Non-certified values.

**BCR-614 SOLUTION – S5**

Congener	Certified mass fraction <sup>1)</sup>	Uncertainty <sup>2)</sup>	Mass fraction expressed in concentration units <sup>3)</sup>	Uncertainty expressed in concentration units <sup>3)</sup>
	(µg/kg)	(µg/kg)	(µg/L)	(µg/L)
2,3,7,8-T <sub>4</sub> CDD	109	4	78.5	2.3
1,2,3,7,8-P <sub>5</sub> CDD	557	11	400	8
1,2,3,4,7,8-HCDD	549	17	394	12
1,2,3,6,7,8-HCDD	556	4	399.1	2.7
1,2,3,7,8,9-HCDD	563	6	404	5
1,2,3,4,6,7,8-HCDD	1118	16	802	11
1,2,3,4,6,7,8,9-O <sub>8</sub> CDD	1115	4	799.9	2.7
2,3,7,8-T <sub>4</sub> CDF	1116	0.8	80.1	0.6
1,2,3,7,8-P <sub>5</sub> CDF	565	0	405	7
2,3,4,7,8-P <sub>5</sub> CDF	558	3	400.4	2.2
1,2,3,4,7,8-HCDF	559	5	401	4
1,2,3,6,7,8-HCDF	557	4	399.9	2.4
1,2,3,7,8,9-HCDF	559	7	401	5
2,3,4,6,7,8-HCDF	555	5	398	4
1,2,3,4,6,7,8-HCDF	1115	5	800	4
1,2,3,4,7,8,9-HCDF	1114	24	799	17
1,2,3,4,6,7,8,9-O <sub>8</sub> CDF	1116	19	801	14
<sup>13</sup> C-2,3,7,8-T <sub>4</sub> CDD	13.95	0.06	10.01	0.05
<sup>13</sup> C-1,2,3,7,8-P <sub>5</sub> CDD	13.9	0.4	10.00	0.23
<sup>13</sup> C-1,2,3,4,7,8-HCDD	13.98	0.7	10.03	0.05
<sup>13</sup> C-1,2,3,6,7,8-HCDD	13.93	0.24	10.00	0.17
<sup>13</sup> C-1,2,3,7,8,9-HCDD	13.95	0.10	10.01	0.07
<sup>13</sup> C-1,2,3,4,6,7,8-HCDD	27.9	0.6	20.0	0.4
<sup>13</sup> C-1,2,3,4,6,7,8,9-O <sub>8</sub> CDD	27.86	0.16	19.99	0.11
<sup>13</sup> C-2,3,7,8-T <sub>4</sub> CDF	13.96	0.09	10.02	0.07
<sup>13</sup> C-1,2,3,7,8-P <sub>5</sub> CDF	13.93	0.24	10.00	0.17
<sup>13</sup> C-2,3,4,7,8-P <sub>5</sub> CDF	13.94	0.06	10.00	0.05
<sup>13</sup> C-1,2,3,4,7,8-HCDF	13.89	0.07	9.97	0.05
<sup>13</sup> C-1,2,3,6,7,8-HCDF	13.93	0.11	9.99	0.08
<sup>13</sup> C-1,2,3,7,8,9-HCDF	13.93	0.10	9.99	0.07
<sup>13</sup> C-2,3,4,6,7,8-HCDF	13.93	0.09	9.99	0.06
<sup>13</sup> C-1,2,3,4,6,7,8-HCDF	27.90	0.20	20.02	0.15
<sup>13</sup> C-1,2,3,4,7,8,9-HCDF	27.86	0.24	19.99	0.17
<sup>13</sup> C-1,2,3,4,6,7,8,9-O <sub>8</sub> CDF	27.87	0.25	20.00	0.18
<sup>13</sup> C-1,2,3,4-T <sub>4</sub> CDD	13.93	0.08	10.00	0.06

**BCR-614 SOLUTION – S6**

Congener	Certified mass fraction <sup>1)</sup>	Uncertainty <sup>2)</sup>	Mass fraction expressed in concentration units <sup>3)</sup>	Uncertainty expressed in concentration units <sup>3)</sup>
	(µg/kg)	(µg/kg)	(µg/L)	(µg/L)
<sup>13</sup> C-1,2,3,7,8-P <sub>5</sub> CDF	139.3	2.3	100.0	1.7
<sup>13</sup> C-1,2,3,7,8,9-HCDF	139.4	0.9	100.0	0.7
<sup>13</sup> C-1,2,3,4,7,8,9-HCDF	278.7	2.4	200.0	1.7

- 1) The certified mass fraction has been calculated from the purity of the individual PCDD/F compounds as assessed in a comprehensive study and the gravimetric preparation of the solution.
- 2) Uncertainties have been calculated by combining contributions from the purity study and the gravimetric preparation; details are given in the certification report.
- 3) Non-certified values.

**BCR-614 SOLUTION – S7**

Congener	Certified mass fraction <sup>1)</sup> Uncertainty <sup>2)</sup>		Mass fraction expressed in concentration units <sup>3)</sup>	Uncertainty expressed in concentration units <sup>3)</sup>
	(µg/kg)	(µg/kg)		
<sup>13</sup> C-2,3,7,8-T <sub>4</sub> CDD	139.5	0.6	100.1	0.4
<sup>13</sup> C-1,2,3,7,8-P <sub>5</sub> CDD	139	4	99.9	2.4
<sup>13</sup> C-1,2,3,4,7,8-HCDD	139.8	0.7	100.3	0.5
<sup>13</sup> C-1,2,3,6,7,8-HCDD	139.3	2.4	100.0	1.7
<sup>13</sup> C-1,2,3,4,6,7,8-HCDD	279	6	200	4
<sup>13</sup> C-1,2,3,4,6,7,8,9-O <sub>8</sub> CDD	278.7	1.6	200.0	1.1
<sup>13</sup> C-2,3,7,8-T <sub>4</sub> CDF	139.5	0.9	100.1	0.6
<sup>13</sup> C-2,3,4,7,8-P <sub>5</sub> CDF	139.2	0.6	99.9	0.4
<sup>13</sup> C-1,2,3,4,7,8-HCDF	138.9	0.6	99.7	0.5
<sup>13</sup> C-1,2,3,6,7,8-HCDF	139.4	1.1	100.0	0.8
<sup>13</sup> C-2,3,4,6,7,8-HCDF	139.4	0.8	100.0	0.6
<sup>13</sup> C-1,2,3,4,6,7,8-HCDF	278.7	2.0	200.0	1.4
<sup>13</sup> C-1,2,3,4,6,7,8,9-O <sub>8</sub> CDF	278.7	2.5	200.0	1.8

**BCR-614 SOLUTION – S8**

Congener	Certified mass fraction <sup>1)</sup> Uncertainty <sup>2)</sup>		Mass fraction expressed in concentration units <sup>3)</sup>	Uncertainty expressed in concentration units <sup>3)</sup>
	(µg/kg)	(µg/kg)		
<sup>13</sup> C-1,2,3,7,8,9-HCDD	558	4	400.5	2.7
<sup>13</sup> C-1,2,3,4-T <sub>4</sub> CDD	557.4	2.7	400.0	2.0

- 1) The certified mass fraction has been calculated from the purity of the individual PCDD/F compounds as assessed in a comprehensive study and the gravimetric preparation of the solution.
- 2) Uncertainties have been calculated by combining contributions from the purity study and the gravimetric preparation; details are given in the certification report.
- 3) Non-certified values.

Availability: BCR-614 Solutions S1-S7 contain about 1 mL solution and BCR-614 Solution S8 about 0.5 mL. The solutions are available individually or as set. A set consists of 11 ampoules, one of S2, S4-S8 and two of S1 and S3. In addition, the set contains an additional solution S9, which is not certified. This solution is intended as complementary tool for QA/QC purposes.

Substance	ERM-AC213 PAHs in Acetonitrile / Toluene (µg/g)			
Benz[ <i>a</i> ]anthracene	3.09	±	0.04	
Chrysene	3.06	±	0.05	
5-methylchrysene	3.08	±	0.07	
Benzo[ <i>b</i> ]fluoranthene	3.05	±	0.05	
Benzo[ <i>k</i> ]fluoranthene	3.06	±	0.08	
Benzo[ <i>j</i> ]fluoranthene	3.05	±	0.10	
Dibenz[ <i>a,h</i> ]anthracene	2.76	±	0.05	
Benzo[ <i>ghi</i> ]perylene	3.07	±	0.05	
Dibenzo[ <i>a,l</i> ]pyrene	2.85	±	0.10	
Dibenzo[ <i>a,e</i> ]pyrene	2.97	±	0.10	
Benzo[ <i>a</i> ]pyrene	2.95	±	0.06	
Indeno[1,2,3- <i>cd</i> ]pyrene	3.13	±	0.05	

Values in brackets are not certified.

Availability: ERM-AC213 consists of 2 mL toluene containing 15 PAHs in an ampoule.

## 1.2 MATRIX MATERIALS

### 1.2.1 CERTIFIED FOR THE TOTAL ELEMENT CONTENT

Substance	BCR-142R Light sandy soil (mg/kg)	ERM-CC141 Loam soil (mg/kg)	BCR-143R Sewage sludge amended soil (mg/kg)	ERM-CC144 Sewage sludge
As		9.9 ± 1.5		7.7 ± 0.7 mg/kg
Cd	0.34 ± 0.04	0.35 ± 0.05	71.8 ± 1.2	14.5 ± 1.4 mg/kg
Co	12.1 ± 0.7	8.5 ± 0.5	12.3 ± 0.3	6.5 ± 0.4 mg/kg
Cr		86 ± 8		168 ± 14 mg/kg
Cu	69.7 ± 1.3	14.4 ± 1.4	130.6 ± 1.5	348 ± 18 mg/kg
Fe				32.9 ± 1.6 g/kg
Hg	0.067 ± 0.011	0.083 ± 0.017	1.10 ± 0.07	5.9 ± 0.6 mg/kg
Mn	970 ± 16	464 ± 18	904 ± 13	352 ± 14 mg/kg
Ni	64.5 ± 2.5	26.4 ± 2.4	299 ± 5	91 ± 7 mg/kg
Pb	40.2 ± 1.9	41 ± 4	179.7 ± 2.1	157 ± 9 mg/kg
Zn	(101 ± 6)	57 ± 4	1055 ± 14	0.98 ± 0.04 g/kg
Aqua regia soluble <sup>1)</sup>				
As	0.249 ± 0.010	7.5 ± 1.4	72.0 ± 1.8	7.7 ± 0.7 mg/kg
Cd	(10.2 ± 0.6)	0.25 ± 0.04	(11.8 ± 1.0)	13.3 ± 0.9 mg/kg
Co		7.9 ± 0.9	426 ± 12	5.9 ± 0.4 mg/kg
Cr	(69.8 ± 1.0)	31 ± 4	(128 ± 7)	150 ± 11 mg/kg
Cu		12.4 ± 0.9	(1.10 ± 0.06)	346 ± 15 mg/kg
Fe				32.8 ± 1.5 g/kg
Hg	(800 ± 50)	0.080 ± 0.008	858 ± 11	6.1 ± 0.7 mg/kg
Mn	61.1 ± 1.5	387 ± 17	296 ± 4	340 ± 13 mg/kg
Ni	25.7 ± 1.6	21.9 ± 1.6	174 ± 5	86 ± 6 mg/kg
Pb	93.3 ± 2.7	32.2 ± 1.4	1063 ± 16	156 ± 7 mg/kg
Zn		50 ± 4		0.97 ± 0.04 g/kg

Values in brackets are not certified.

Availability: Glass bottles containing about 50 g of powdered material; ERM-CC141 contains minimum 24 g; ERM-CC144 minimum 30 g.

<sup>1)</sup> Details of the analytical procedure to obtain the aqua regia soluble content of the elements are given in the certification report.

Substance	BCR-667 Estuarine sediment (mg/kg)	ERM-CC690 Calcareous soil (mg/kg)
Br	(99.7 ± 2.5)	
Cd	(0.67 ± 0.11)	
Ce	56.7 ± 2.5	49.1 ± 2.5
Co	(23.0 ± 1.3)	
Cr	(178 ± 16)	
Cs	(7.8 ± 0.7)	
Cu	(60 ± 9)	
Dy	4.01 ± 0.14	2.90 ± 0.28
Er	2.35 ± 0.15	
Eu	1.00 ± 0.05	
Fe	(44800 ± 1)	
Gd	4.41 ± 0.12	3.2 ± 0.4
Ho	0.80 ± 0.06	
La	27.8 ± 1.0	24.4 ± 1.7
Lu	0.325 ± 0.020	
Mn	(920 ± 40)	
Nd	25.0 ± 1.4	19.1 ± 2.2
Ni	(128 ± 9)	
Pb	(31.9 ± 1.1)	
Pr	6.1 ± 0.5	
Sb	(0.96 ± 0.05)	
Sc	13.7 ± 0.7	7.9 ± 0.9
Se	(1.59 ± 0.08)	
Sm	4.66 ± 0.20	3.5 ± 0.4
Ta	(0.876 ± 0.017)	
Tb	0.682 ± 0.017	0.50 ± 0.07
Th	10.0 ± 0.5	7.6 ± 0.8
Tm	0.326 ± 0.025	0.232 ± 0.026
U	2.26 ± 0.15	1.90 ± 0.23
Yb	2.20 ± 0.09	1.57 ± 0.19
Zn	(175 ± 13)	

Values in brackets are not certified.

Availability: BCR-667: Glass bottles containing about 40 g of powdered material.

ERM-CC690: Glass bottles containing about 70 g of powdered material. The report gives additional indicative values for As, Au, Co, Cr, Cs, Cu, Er, Eu, Fe, Hf, Ho, Lu, Ni, Pb, Pr, Sb, Ta, W, Y and Zn.



Substance	BCR-277R Estuarine sediment (mg/kg)			BCR-280R Lake sediment (mg/kg)			BCR-320R Channel sediment (mg/kg)		
		±			±			±	
As	18.3	±	1.8	33.4	±	2.9	21.7	±	2.0
Cd	0.61	±	0.07	0.85	±	0.10	2.64	±	0.18
Co	22.5	±	1.4	16.8	±	0.9	9.7	±	0.6
Cr	188	±	14	126	±	7	59	±	4
Cu	63	±	7	53	±	6	46.3	±	2.9
Fe							25700	±	1300
Hg	0.128	±	0.017	1.46	±	0.20	0.85	±	0.09
Mn							910	±	50
Ni	130	±	8	69	±	5	27.1	±	2.2
Pb							85	±	5
Sc							5.2	±	0.4
Se	(0.58	±	0.11)	(0.46	±	0.09)	(0.96	±	0.18)
Sn	(6.5	±	1.8)	(9.5	±	1.7)	(9.4	±	1.7)
Th							5.3	±	0.4
Tl							0.65	±	0.08
U							1.56	±	0.20
V							46.5	±	2.8
Zn	178	±	20	224	±	25	318	±	20

Values in brackets are not certified.

Availability: Amber glass bottles containing 40 g of powder for BCR-277R and BCR-320R and 30 g for BCR-280R.

Substance	BCR-145R Sewage sludge (mixed origin) (mg/kg)			BCR-146R Sewage sludge (industrial origin) (mg/kg)		
		±			±	
Cd	3.50	±	0.15	18.8	±	0.5
Co	5.6	±	0.4	7.39	±	0.27
Cr				196	±	7
Cu	696	±	12	838	±	16
Hg	2.01	±	0.22	8.6	±	0.4
Mn	156	±	4	323	±	7
Ni	247	±	7	70	±	5
Pb	286	±	5	609	±	14
Zn	2122	±	23	3060	±	60
Aqua regia soluble <sup>1)</sup>						
Cd	(3.43	±	0.17)	18.4	±	0.4
Co	(5.3	±	0.7)	6.5	±	0.4
Cr	307	±	13	174	±	7
Cu	707	±	9	831	±	16
Hg	(1.99	±	0.08)	8.39	±	0.25
Mn	(145	±	7)	298	±	9
Ni	251	±	6	65.0	±	3.0
Pb	282	±	9	583	±	17
Zn	2140	±	50	3040	±	60

Values in brackets are not certified.

Availability: Glass bottles containing about 50 g of powdered material for BCR-146R, 40 g for BCR-145R.

<sup>1)</sup> Details of the analytical procedure to obtain the aqua regia soluble content of the elements are given in the certification report.

Substance	ERM-CC580 Estuarine sediment (mg/kg)		
		±	
Total Hg	132	±	3
CH <sub>3</sub> Hg <sup>+</sup>	0.075	±	0.004

Availability: Glass bottles containing about 40 g powder.

Substance	<b>BCR-038</b>		
	Fly ash from pulverised coal (mg/kg)		
As	48.0	±	2.3
Cd	4.6	±	0.3
Co	53.8	±	1.9
Cr	192	±	10
Cu	176	±	9
Fe	33.8 × 10 <sup>3</sup>	±	0.7 × 10 <sup>3</sup>
Hg	2.10	±	0.15
Mn	479	±	16
Na	3.74 × 10 <sup>3</sup>	±	0.15 × 10 <sup>3</sup>
Pb	262	±	11
Zn	581	±	29

Availability: BCR-038 in ampoules containing about 5 g.

Substance	<b>BCR-176R</b>		
	Fly ash (mg/kg)		
As	54	±	5
Cd	226	±	19
Co	26.7	±	1.6
Cr	810	±	70
Cu	1050	±	70
Fe	13100	±	500
Hg	(1.60	±	0.23)
Mn	(730	±	50)
Ni	117	±	6
Pb	5000	±	500
Sb	850	±	50
Se	18.3	±	1.9
Tl	1.32	±	0.21
V	(35	±	6)
Zn	16800	±	400

Values in brackets are not certified.

The report gives additional indicative values for Ag, Au, Ba, Br, Ce, Cs, Eu, Hf, La, Na, Rb, Sc, Ta, Th and W.

Availability: Amber glass bottles containing about 40 g of powdered material.

Substance	<b>BCR-723</b>		
	Trace elements in road dust (µg/kg)		
Pd	6.1	±	1.9
Pt	81.3	±	2.5
Rh	12.8	±	1.3

Availability: Brown glass bottles with screw cap containing approximately 25 g of powder.

Substance	<b>ERM-CZ120</b>		
	Elements in fine dust (PM <sub>10</sub> -like) (mg/kg)		
As	7.1	±	0.7
Cd	0.90	±	0.22
Pb	113	±	17
Ni	58	±	7

Availability: Vial containing approximately 0.5 g of fine dust.

Substance	BCR-596 Trapa natans (Aquatic plant) (mg/kg)		
Cr	36.3	±	1.7

Availability: CRM is provided in units of 25 g.

Substance	BCR-129 Hay powder (g/kg)			BCR-402 White clover (mg/kg)		
As				0.093	±	0.010
Ca	6.40	±	0.10			
Co				0.178	±	0.008
I	$0.167 \times 10^{-3}$	±	$0.024 \times 10^{-3}$			
K	33.8	±	0.8			
Mg	1.45	±	0.04			
Mo				6.93	±	0.19
N	37.2	±	0.5			
P	2.36	±	0.07			
S	3.16	±	0.04			
Se				6.70	±	0.25
Zn	$32.1 \times 10^{-3}$	±	$1.7 \times 10^{-3}$			
Kjeldahl-N	34.2	±	0.4			

Availability: CRMs are provided in powder form in bottles containing approximately for BCR-129 30 g, BCR-402 25 g.

Note: BCR-402 was produced from white clover grown on a ground specially rich in selenium. This explains the high content of this element.

Substance	ERM-CD281 Rye grass (mg/kg)		
As	0.042	±	0.010
B	5.5	±	0.5
Ca		(6.3 g/kg)	
Cd	0.120	±	0.007
Cr	24.8	±	1.3
Cu	10.2	±	0.5
Fe		(0.18 g/kg)	
Hg	0.0164	±	0.0022
K		(34 g/kg)	
Mg		(1.6 g/kg)	
Mn	82	±	4
Mo	2.22	±	0.12
Na		(4.0 g/kg)	
Ni	15.2	±	0.6
P		(2.8 g/kg)	
Pb	1.67	±	0.11
S		(3.4 g/kg)	
Sb	0.042	±	0.007
Se	0.023	±	0.004
Si		(1.3 g/kg)	
Sn	0.062	±	0.011
Zn	30.5	±	1.1

Values in brackets are not certified.

Availability: Amber glass vial containing approximately 10 g.

Substance	BCR-414 Plankton (mg/kg)		
As	6.82	±	0.28
Cd	0.383	±	0.014
Co	(1.43	±	0.06)
Cr	23.8	±	1.2
Cu	29.5	±	1.3
Fe	(1.85	±	0.19 g/kg)
Hg	0.276	±	0.018
K	(7.55	±	0.17 g/kg)
Mn	299	±	13
Mo	(1.35	±	0.20)
Ni	18.8	±	0.8
Pb	3.97	±	0.19
Sc	(0.54	±	0.02)
Se	1.75	±	0.10
Sr	(261	±	25)
V	8.10	±	0.18
Zn	111.6	±	2.5

Values in brackets are not certified.

Availability: CRM is provided in powder form in bottles containing approximately 5 g.

Substance	BCR-482 Lichen (mg/kg)			ERM-CD200 Bladderwrack (Fucus vesiculosus) (mg/kg)		
		±			±	
Al	1103	±	24			
As	0.85	±	0.07	55	±	4
Cd	0.56	±	0.02	0.95	±	0.06
Cr	4.12	±	0.15			
Cu	7.03	±	0.19	1.71	±	0.18
Hg	0.48	±	0.02	0.0186	±	0.0016
Ni	2.47	±	0.07			
Pb	40.9	±	1.4	0.51	±	0.06
Se				0.088	±	0.010
Zn	100.6	±	2.2	25.3	±	1.7

Availability: BCR-482 is provided in powder form in bottles containing approximately 15 g.

ERM-CD200 is provided in powder form in bottles containing approximately 5 g.

Substance	BCR-670 Lemna minor (Aquatic plant) (duck weed) (µg/kg)		
As	(1980	±	190)
Cd	(75.5	±	2.5)
Ce	990	±	40
Cr	(2050	±	100
Cs	(77	±	10)
Cu	(1820	±	300)
Dy	79	±	7
Er	44.0	±	2.8
Eu	23.2	±	1.5
Gd	98	±	8
Ho	15.8	±	1.8
La	487	±	20
Lu	6.3	±	0.5
Mo	(560	±	70)
Nd	473	±	15
Pb	(2060	±	120)
Pr	121	±	6
Sc	191	±	11
Sm	94	±	7
Tb	14.0	±	1.1
Th	159	±	18
Tm	5.7	±	0.7
U	82	±	8
Y	460	±	60
Yb	40	±	4
Zn	(24000	±	2100)

Values in brackets are not certified.

Availability: Glass bottles containing about 10 g of powdered material.

Substance	ERM-CE278k Mussel tissue (mg/kg)			ERM-CE101 Trout muscle (mg/kg)		
As	6.7	±	0.4	0.175	±	0.017
Ag	(0.044	±	0.016)			
Cd	0.336	±	0.025			
Cr	0.73	±	0.22			
Cu	5.98	±	0.27			
Fe	161	±	8	3.1	±	0.6
Hg	0.071	±	0.007	0.0219	±	0.0027
Mn	4.88	±	0.24	0.108	±	0.017
Ni	0.69	±	0.15	(0.051	±	0.012)
Pb	2.18	±	0.18			
Rb	2.46	±	0.16			
Se	1.62	±	0.12	0.113	±	0.011
Sr	19.0	±	1.2			
Zn	71	±	4	4.5	±	0.6

Values in brackets are not certified.

Availability: ERM-CE278k is provided in powder form in bottles containing approximately 8 g.

ERM-CE101 consists of 40 g of homogenised, heat-treated fish muscle contained in a glass jar.

Substance	BCR-668		
	Mussel tissue (µg/kg)		
As	(7100	±	500)
Cd	(275	±	11)
Ce	89	±	7
Cr	(370	±	60)
Cs	(13.8	±	1.5)
Dy	8.9	±	0.6
Er	4.5	±	0.5
Eu	2.79	±	0.16
Gd	13.0	±	0.6
Ho	(1.8	±	0.6)
La	80	±	6
Lu	0.389	±	0.024
Mo	(1990	±	150)
Nd	54	±	4
Pr	12.3	±	1.1
Sc	(8.5	±	1.8)
Sm	11.2	±	0.8
Tb	1.62	±	0.12
Th	10.7	±	1.2
Tm	0.48	±	0.08
U	56	±	5
Y	59	±	5
Yb	(2.8	±	0.5)
Zn	(70700	±	400)

Values in brackets are not certified.

Availability: Glass bottles containing about 10 g of powdered material.

Substance	ERM-CE464		
	Tuna fish (mg/kg)		
Total Hg	5.24	±	0.10
CH <sub>3</sub> Hg <sup>+</sup>	5.50	±	0.17

Availability: Glass bottles containing about 15 g.

Substance	BCR-505			BCR-579		
	Trace elements in estuarine water (nmol/kg)			Coastal sea-water (ng/kg)		
Cd	0.80	±	0.04	1.9	±	0.5
Co	(0.99	±	0.26)			
Cu	29.4	±	1.5			
Fe	(19	±	4)			
Hg						
Ni	24.1	±	2.0			
Pb	(0.24	±	0.14)			
Zn	172	±	11			

Values in brackets are not certified.

Availability: BCR-505 is provided in 1 L polyethylene bottles and BCR-579 in 1 L glass bottles.

Substance	<b>ERM-CA408</b> Simulated rainwater (low contents) (mg/L)		
<b>Mass concentration:</b>			
Ammonium	0.910	±	0.028
Cl	1.96	±	0.07
Fluoride	0.194	±	0.008
Mg	0.145	±	0.022
NO <sub>3</sub>	2.01	±	0.09
<i>Ortho</i> -phosphate	1.00	±	0.05
SO <sub>4</sub>	1.46	±	0.04
<b>Electrochemical property:</b>			
Conductivity (20 °C)	18.7	±	1.8 μS/cm
pH (20 °C)	6.3	±	0.6

Availability: ERM-CA408 is provided in units of about 95 mL in flame-sealed ampoules.

Substance	<b>BCR-479</b> Freshwater (low contents)		<b>BCR-480</b> Freshwater (high contents)	
Nitrate				
As amount of substance content	214	± 4	885	± 13
As mass fraction	13.3	± 0.3	54.9	± 0.8
		μmol/kg		μmol/kg
		mg/kg		mg/kg

Availability: Units of about 100 mL in white glass ampoules.

Substance	<b>BCR-611</b> Bromide in ground water based on IC-measurements (low contents) (μg/kg)		<b>BCR-612</b> Bromide in ground water based on IC-measurements (high contents) (μg/kg)	
Br	93	± 4	252	± 10

Availability: Set of four brown glass ampoules of 25 mL.

Substance	<b>ERM-CA616</b> Ground water (high carbonate content) (mg/L)		
	<b>Mass concentration:</b>		
Ca	42.6	±	1.4
Cl	44.6	±	10.9
K	5.79	±	0.15
Mg	10.1	±	0.3
Na	27.9	±	0.8
<i>Ortho</i> -phosphate	2.24	±	0.10
	<b>Electrochemical property:</b>		
Conductivity (20 °C)	426	±	5 μS/cm
pH (20 °C)	7.12	±	0.18

Availability: ERM-CA616 consists of about 95 mL natural groundwater in a flame-sealed ampoule

Substance	ERM-CA615 Groundwater			
As	9.9	±	0.7	µg/L
Cd	0.106	±	0.011	µg/L
Fe	5.11	±	0.26	mg/L
Hg	0.037	±	0.004	µg/L
Mn	107	±	5	µg/L
Ni	25.3	±	1.1	µg/L
Pb	7.1	±	0.6	µg/L

Availability: One unit consists of about 95 mL natural groundwater in a flame-sealed ampoule.

Substance	ERM-CA713 Wastewater µg/L			
As	10.8	±	0.3	
Cd	5.09	±	0.20	
Cr	20.9	±	1.3	
Cu	101	±	7	
Fe	445	±	27	
Hg	1.84	±	0.11	
Mn	95	±	4	
Ni	50.3	±	1.4	
Pb	49.7	±	1.7	
Se	4.9	±	1.1	

Availability: ampoule containing approximately 100 mL of wastewater effluent acidified with HNO<sub>3</sub> to about pH 2.

Substance	ERM-CA400 Seawater			
Hg mass concentration	16.8	±	1.1	ng/L
Hg mass fraction	16.4	±	1.0	ng/kg
True density at 20 °C	1.0226	±	0.0003	g/cm <sup>3</sup>

Availability: One unit consists of 3 vials, each containing 100 mL acidified coastal surface seawater.

Substance	ERM-CA403 Seawater µg/L			
As	1.90	±	0.13	
Cd	0.094	±	0.011	
Co	0.074	±	0.011	
Cu	0.87	±	0.13	
Mn	2.47	±	0.11	
Mo	12.0	±	0.6	
Ni	1.04	±	0.16	
Pb	0.098	±	0.010	
True density at 20 °C	1.02352	±	0.00005	g/mL

Availability: The sample consists of about 500 mL of seawater acidified to 1 < pH < 2 with hydrochloric acid.



## 1.2.2 CERTIFIED FOR THE EXTRACTABLE ELEMENT CONTENT AND SPECIES

Substance	BCR-483 Sewage sludge amended soil (mg/kg)			BCR-484 Sewage sludge amended (terra rossa) soil (mg/kg)			BCR-700 Organic-rich soil (mg/kg)		
<u>EDTA:</u>									
Cd	24.3	±	1.3	0.509	±	0.030	65.2	±	3.5
Cr	28.6	±	2.6				10.1	±	0.9
Cu	215	±	11	88	±	4	89.4	±	2.8
Ni	28.7	±	1.7	1.39	±	0.11	53.2	±	2.8
Pb	229	±	8	47.9	±	2.6	103	±	5
Zn	612	±	20	152	±	7	510	±	17
<u>Acetic acid:</u>									
Cd	18.3	±	0.6	0.48	±	0.04	67.5	±	2.8
Cr	18.7	±	1.0				19.0	±	1.1
Cu	33.5	±	1.6	33.9	±	1.4	36.3	±	1.6
Ni	25.8	±	1.0	1.69	±	0.16	99.0	±	5.1
Pb	2.10	±	0.25	1.17	±	0.16	4.85	±	0.38
Zn	620	±	24	193	±	7	719	±	24
<u>Calcium chloride extractable content</u>									
Cd	(0.45	±	0.05)	(< 0.08)					
Cr	(0.35	±	0.09)	(< 0.09)					
Cu	(1.2	±	0.4)	(0.67	±	0.29)			
Ni	(1.4	±	0.2)	(< 0.05)					
Pb	(< 0.06)			(< 0.06)					
Zn	(8.3	±	0.7)	(0.31	±	0.17)			
<u>Sodium nitrate extractable content</u>									
Cd	(0.08	±	0.03)	(< 0.05)					
Cr	(0.30	±	0.07)	(< 0.03)					
Cu	(0.89	±	0.22)	(0.48	±	0.15)			
Ni	(0.65	±	0.07)	(0.023	±	0.005)			
Pb	(< 0.03)			(< 0.06)					
Zn	(2.7	±	0.8)	(0.09	±	0.04)			
<u>Ammonium nitrate extractable content</u>									
Cd	(0.26	±	0.05)	(0.003	±	0.002)			
Cr	(0.27	±	0.10)	(< 0.06)					
Cu	(1.2	±	0.3)	(1.1	±	0.4)			
Ni	(1.1	±	0.3)	(0.033	±	0.017)			
Pb	(0.020	±	0.013)	(< 0.06)					
Zn	(6.5	±	0.9)	(0.17	±	0.05)			

Availability: BCR-483 and -484 are provided in glass bottles containing about 70 g of powder. BCR-700 is provided in glass bottles containing about 40 g of powder.

Substance	BCR-684 River sediment (mg/kg)		
NaOH-extractable P	550	±	21
HCl-extractable P	536	±	28
Inorganic P	1113	±	24
Organic P	209	±	9
Conc. HCl-extract. P	1373	±	35

Availability: Glass bottles containing about 35 g of powdered material.

Substance	<b>BCR-701</b> Lake sediment (mg/kg)		
	<u>Extractable mass fraction based on dry mass</u>		
<u>Step 1:</u> Cd	7.3	±	0.4
Cr	2.26	±	0.16
Cu	49.3	±	1.7
Ni	15.4	±	0.9
Pb	3.18	±	0.21
Zn	205	±	6
<u>Step 2:</u> Cd	3.77	±	0.28
Cr	45.7	±	2.0
Cu	124	±	3
Ni	26.6	±	1.3
Pb	126	±	3
Zn	114	±	5
<u>Step 3:</u> Cd	0.27	±	0.06
Cr	143	±	7
Cu	55	±	4
Ni	15.3	±	0.9
Pb	9.3	±	2.0
Zn	46	±	4
	<u>Mass fraction based on dry mass</u>		
Cd	(0.13	±	0.08)
Cr	(62.5	±	7.4)
Cu	(38.5	±	11.2)
Ni	(41.4	±	4.0)
Pb	(11.0	±	5.2)
Zn	(95	±	13)

Values in brackets are not certified.

Availability: Glass bottles containing about 20 g of powdered material.

Substance	<b>BCR-462</b> Coastal sediment (µg/kg)			<b>BCR-646</b> Freshwater sediment (µg/kg)		
	Tributyltin (TBT)	54	±	15	480	±
Dibutyltin (DBT)	68	±	12	770	±	90
Monobutyltin (MBT)				610	±	120
Triphenyltin (TPhT)				29	±	11
Diphenyltin (DPhT)				36	±	8
Monophenyltin (MPhT)				69	±	18

Availability: Glass bottle containing about 25 g of powder for BCR-462 and 40 g of powder for BCR-646.

Substance	<b>ERM-CC580</b> Estuarine sediment (mg/kg)		
Total Hg	132	±	3
CH <sub>3</sub> Hg <sup>+</sup>	0.075	±	0.004

Availability: Glass bottles containing about 40 g powder.

	<b>BCR-545</b> Welding dust loaded on a filter (g/kg)		
Cr (VI)	40.2	±	0.6
total leachable Cr	39.5	±	1.3

Availability: Glass fibre filter loaded with welding dust containing about 100 µg Cr (VI).

Substance	<b>ERM-CE477</b> Mussel tissue (mg/kg)		
Tributyltin (TBT)	2.20	±	0.19
Dibutyltin (DBT)	1.54	±	0.12
Monobutyltin (MBT)	1.50	±	0.28

Availability: Glass bottle containing about 14 g of powder.

Substance	<b>ERM-CE464</b> Tuna fish (mg/kg)		
Total Hg	5.24	±	0.10
CH <sub>3</sub> Hg <sup>+</sup>	5.50	±	0.17

Availability: Glass bottles containing about 15 g powder.

Substance	<b>BCR-627</b> Tuna fish tissue				<b>ERM-BC211</b> Rice			
Total As	4.8	±	0.3	mg/kg	260	±	13	µg/kg
Dimethylarsinic acid	2.0	±	0.3	µmol/kg	119	±	13	µg/kg
Sum of arsenite and arsenate					124	±	11	µg/kg
Arsenobetaine	52	±	3	µmol/kg				

Availability: BCR-627: Glass bottles containing about 10 g powder  
ERM-BC211: Vial containing about 10 g of powder

### 1.2.3 CERTIFIED FOR ORGANIC POLLUTANTS

Substance	<b>ERM-CZ100</b> Fine dust (PM <sub>10</sub> -like) (mg/kg)		
Benz[a]anthracene	0.91	±	0.07
Benzo[a]pyrene	0.72	±	0.05
Benzo[b]fluoranthene	1.42	±	0.14
Benzo[j]fluoranthene	0.75	±	0.14
Benzo[k]fluoranthene	0.67	±	0.06
Dibenzo[a,h]anthracene	0.18	±	0.04
Indeno[1,2,3-c,d]pyrene	1.07	±	0.10
Sum of Benzo[b]fluoranthene, benzo[k]fluoranthene and benzo[j]fluoranthene	2.84	±	0.21

Availability: Vial containing about 0.5 g of fine dust.

Substance	BCR-524 Contaminated industrial soil (mg/kg)		
Pyrene	173	±	11
Benzo[a]anthracene	22.5	±	1.8
Benzo[a]pyrene	8.6	±	0.5
Benzo[e]pyrene	10.6	±	1.4
Benzo[b]fluoranthene	13.5	±	1.6
Benzo[k]fluoranthene	6.2	±	0.6
Benzo[b]naphtho[2,1-d]-thiophene	3.8	±	0.6
Indeno[1,2,3-cd]pyrene	5.1	±	0.4
Pentachlorophenol	0.034	±	0.005

Availability: Glass bottle containing about 40 g of powder.

Substance	BCR-535 Freshwater harbour sediment (mg/kg)		
Pyrene	2.52	±	0.18
Benzo[a]anthracene	1.54	±	0.10
Benzo[a]pyrene	1.16	±	0.10
Benzo[e]pyrene	1.86	±	0.13
Benzo[b]fluoranthene	2.29	±	0.15
Benzo[k]fluoranthene	1.09	±	0.15
Indeno[1,2,3-cd]pyrene	1.56	±	0.14

Availability: Glass bottle containing about 40 g of powder.

Polychlorinated biphenyls (IUPAC No.)	BCR-481 Industrial soil (mg/kg)			BCR-536 Freshwater harbour sediment (µg/kg)		
28				44	±	5
52				38	±	4
101	37	±	3	44	±	4
105				3.5	±	0.6
118	9.4	±	0.7	28	±	3
128	9.1	±	0.8	5.4	±	1.2
138				27	±	4
149	97	±	7	49	±	4
153	137	±	7	50	±	4
156	7.0	±	0.5	3.0	±	0.4
163				17	±	3
170	52	±	4	13.4	±	1.4
180	124	±	6	22	±	2

Availability: BCR-481 is provided in brown glass bottles with a polyethylene insert containing approximately 25 g of soil. BCR-536 is provided in a glass bottle containing about 40 g of powder.

Substance	BCR-529 Industrial (sandy) soil				BCR-530 Industrial (clay) soil			
3,4-dichlorophenol	0.23	±	0.04	mg/kg	6.0	±	0.5	mg/kg
2,4,5-trichlorophenol	1.51	±	0.10	mg/kg	40	±	7	mg/kg
Pentachlorophenol	0.23	±	0.04	mg/kg	0.47	±	0.09	mg/kg
2,3,7,8 - TCDD (D48)	4.5	±	0.6	µg/kg				
1,2,3,7,8 - PeCDD (D54)	0.44	±	0.05	µg/kg				
1,2,3,4,7,8 - HxCDD (D66)	1.22	±	0.21	µg/kg				
1,2,3,6,7,8 - HxCDD (D67)	5.4	±	0.9	µg/kg	0.061	±	0.011	µg/kg
1,2,3,7,8,9 - HxCDD (D70)	3.0	±	0.4	µg/kg	0.0218	±	0.0029	µg/kg
2,3,7,8 - TCDF (F83)	0.078	±	0.013	µg/kg				
1,2,3,7,8 - PeCDF (F94)	0.145	±	0.028	µg/kg	0.24	±	0.04	µg/kg
2,3,4,7,8 - PeCDF (F114)	0.36	±	0.07	µg/kg	0.62	±	0.07	µg/kg
1,2,3,4,7,8 - HxCDF (F118)	3.4	±	0.5	µg/kg	0.321	±	0.016	µg/kg
1,2,3,6,7,8 - HxCDF (F121)	1.09	±	0.15	µg/kg	0.186	±	0.023	µg/kg
1,2,3,7,8,9 - HxCDF (F124)	0.022	±	0.010	µg/kg				
2,3,4,6,7,8 - HxCDF (F130)	0.37	±	0.05	µg/kg	0.126	±	0.012	µg/kg

Availability: Amber glass bottles containing about 50 g of dried soil.

Substance	BCR-677 Sewage sludge (ng/kg)		
2,3,7,8 - T <sub>4</sub> CDD (D48)	1.51	±	0.16
1,2,3,7,8 - P <sub>5</sub> CDD (D54)	4.1	±	0.9
1,2,3,6,7,8 - H <sub>6</sub> CDD (D67)	235	±	16
1,2,3,7,8,9 - H <sub>6</sub> CDD (D70)	79	±	7
1,2,3,4,6,7,8 - H <sub>7</sub> CDD (D73)	3.5 x 10 <sup>3</sup>	±	0.4 x 10 <sup>3</sup>
O <sub>8</sub> CDD (D75)	12.7 x 10 <sup>3</sup>	±	0.8 x 10 <sup>3</sup>
2,3,7,8 - T <sub>4</sub> CDF (F83)	45	±	4
1,2,3,7,8 - P <sub>5</sub> CDF (F94)	24.8	±	1.6
2,3,4,7,8 - P <sub>5</sub> CDF (F114)	16.9	±	1.5
1,2,3,4,7,8 - H <sub>6</sub> CDF (F118)	14.5	±	1.6
1,2,3,6,7,8 - H <sub>6</sub> CDF (F121)	6.1	±	0.8
1,2,3,7,8,9 - H <sub>6</sub> CDF (F124)	0.84	±	0.29
2,3,4,6,7,8 - H <sub>6</sub> CDF (F130)	5.6	±	0.6
1,2,3,4,6,7,8 - H <sub>7</sub> CDF (F131)	62	±	3
1,2,3,4,7,8,9 - H <sub>7</sub> CDF (F134)	6.3	±	0.8
O <sub>8</sub> CDF (F135)	177	±	7

Availability: BCR-677 consists of approximately 40 g of dried sewage sludge in amber glass bottles.

Substance	BCR-490 Fly ash (µg/kg)		
2,3,7,8 - T <sub>4</sub> CDD (D48)	0.169	±	0.012
1,2,3,7,8 - P <sub>5</sub> CDD (D54)	0.67	±	0.04
1,2,3,4,7,8 - H <sub>6</sub> CDD (D66)	0.95	±	0.11
1,2,3,6,7,8 - H <sub>6</sub> CDD (D67)	4.8	±	0.4
1,2,3,7,8,9 - H <sub>6</sub> CDD (D70)	2.84	±	0.17
2,3,7,8 - T <sub>4</sub> CDF (F83)	0.90	±	0.05
1,2,3,7,8 - P <sub>5</sub> CDF (F94)	1.71	±	0.12
2,3,4,7,8 - P <sub>5</sub> CDF (F114)	1.85	±	0.11
1,2,3,4,7,8 - H <sub>6</sub> CDF (F118)	2.37	±	0.12
1,2,3,6,7,8 - H <sub>6</sub> CDF (F121)	2.64	±	0.14
1,2,3,7,8,9 - H <sub>6</sub> CDF (F124)	0.34	±	0.05
2,3,4,6,7,8 - H <sub>6</sub> CDF (F130)	2.47	±	0.17

Availability: BCR-490 consists of approximately 30 g of fly ash in amber glass bottles.

Substance	BCR-615 Fly ash (low level) (ng/kg)		
2,3,7,8 - T <sub>4</sub> CDD (D48)	27	±	5
1,2,3,7,8 - P <sub>5</sub> CDD (D54)	92	±	12
1,2,3,4,7,8 - H <sub>6</sub> CDD (D66)	74	±	12
1,2,3,6,7,8 - H <sub>6</sub> CDD (D67)	103	±	13
1,2,3,7,8,9 - H <sub>6</sub> CDD (D70)	108	±	16
1,2,3,4,6,7,8 - H <sub>7</sub> CDD (D73)	0.87 x 10 <sup>3</sup>	±	0.13 x 10 <sup>3</sup>
O <sub>8</sub> CDD (D75)	1.75 x 10 <sup>3</sup>	±	0.20 x 10 <sup>3</sup>
2,3,7,8 - T <sub>4</sub> CDF (F83)	86	±	28
1,2,3,7,8 - P <sub>5</sub> CDF (F94)	176	±	26
2,3,4,7,8 - P <sub>5</sub> CDF (F114)	125	±	20
1,2,3,4,7,8 - H <sub>6</sub> CDF (F118)	203	±	21
1,2,3,6,7,8 - H <sub>6</sub> CDF (F121)	204	±	23
1,2,3,7,8,9 - H <sub>6</sub> CDF (F124)	13.3	±	2.0
2,3,4,6,7,8 - H <sub>6</sub> CDF (F130)	130	±	15
1,2,3,4,6,7,8 - H <sub>7</sub> CDF (F131)	0.75 x 10 <sup>3</sup>	±	0.09 x 10 <sup>3</sup>
1,2,3,4,7,8,9 - H <sub>7</sub> CDF (F134)	61	±	6
O <sub>8</sub> CDF (F135)	0.29 x 10 <sup>3</sup>	±	0.04 x 10 <sup>3</sup>

Availability: BCR-615 consists of approximately 50 g of dried fly ash in amber glass bottles.

Substance	BCR-683 Beech wood (mg/kg)		
Benz[a]anthracene	6.5	±	0.7
Benzo[a]pyrene	3.4	±	0.4
Benzo[e]pyrene	9.3	±	1.0
Benzo[b]fluoranthene	5.8	±	0.6
Benzo[k]fluoranthene	2.58	±	0.29
Pentachlorophenol	3.6	±	0.5

Availability: Glass bottle containing about 60 g of powder.

Polychlorinated biphenyls (IUPAC No.)	BCR-682 Mussel tissue (µg/kg)			BCR-718 Canned fresh herring (µg/kg)		
28	0.30	±	0.07	0.41	±	0.04
52	0.78	±	0.09	1.00	±	0.04
101				2.12	±	0.06
105				0.63	±	0.06
118	2.6	±	0.3	1.78	±	0.07
128				0.62	±	0.101
138	4.6	±	0.8	2.97	±	0.11
149	5.7	±	0.9	2.58	±	0.11
153	9.2	±	0.8	4.62	±	0.10
170	0.17	±	0.05	0.350	±	0.026
180	0.77	±	0.07	0.795	±	0.027

Availability: BCR-682 and BCR-718 are provided in sealed tin cans containing approximately 70 g fresh mussel tissue.

Polychlorinated biphenyls (IUPAC No.)	BCR-420 Waste mineral oil (low level) (mg/kg)			BCR-449 Waste mineral oil (high level) (mg/kg)		
28	0.61	±	0.06	0.80	±	0.07
52				31.4	±	1.8
101	1.45	±	0.18	57.2	±	1.9
105				17.4	±	1.0
118	1.69	±	0.14	46.6	±	2.4
128				12.5	±	0.7
153	0.92	±	0.06	39.0	±	1.7
156				6.9	±	0.5
170				6.6	±	0.6
180	0.195	±	0.017	10.4	±	0.4

Availability: BCR-420 is provided in units of about 7.5 g in glass ampoules and BCR-449 in units of about 50 g in glass ampoules.

Substance	IRMM-427 Fish tissue (Pike-Perch) (ng/g)		
Linear perfluorooctane sulfonate (L-PFOS)	16.0	±	1.7
Perfluorodecanoic acid (PFDA)	1.28	±	0.17
Perfluoroundecanoic acid (PFUnDA)	0.74	±	0.20
Perfluorododecanoic acid (PFDoDA)	0.97	±	0.21

Availability: Glass jars containing 35 g of fish paste.

Substance	IRMM-428 Water (ng/L)		
Perfluorobutane sulfonate (PFBS)	5.5	±	1.4
Perfluorohexane sulfonate (PFHxS)	3.6	±	1.0
Linear perfluorooctane sulfonate (L-PFOS)	9.6	±	1.7
Perfluoropentanoic acid (PFPeA)	4.0	±	1.0
Perfluorohexanoic acid (PFHxA)	7.4	±	1.0
Perfluoroheptanoic acid (PFHpA)	3.7	±	0.7

Availability: High density polyethylene bottles containing 410 mL of water.

Substance	ERM-CA100 Surface water			
Naphthalene	1.21	±	0.13	µg/L
Anthracene	91	±	11	ng/L
Fluoranthene	104	±	11	ng/L
Benzo[b]fluoranthene	32	±	9	ng/L
Benzo[k]fluoranthene	38	±	9	ng/L
Benzo[a]pyrene	42	±	8	ng/L
Indeno[1,2,3-cd]pyrene	29	±	7	ng/L

Availability: The CRM is available as unit kit that includes a plastic container with at least 1000 mL of surface water, an amber glass ampoule with at least 24 mL humic acids solution in water and an amber glass ampoule with at least 2 mL PAH solution in acetonitrile.

Substance	ERM-CE100 Fish tissue (µg/kg)			
Hexachlorobenzene	120	±	8	
Hexachlorobutadiene	36	±	4	

Availability: The CRM is available in glass jars with twist-off lids containing approximately 40g of fish paste.

Substance	ERM-CE102 Fish tissue (PBDEs in fish tissue) (µg/kg)			
BDE-28 (2,4,4'-tribromodiphenyl ether)	(0.0077)	±	(0.0010)	
BDE-47 (2,2',4,4'-tetrabromodiphenyl ether)	0.227	±	0.019	
BDE-49 (2,2',4,5'-tetrabromodiphenyl ether)	0.033	±	0.007	
BDE-99 (2,2',4,4',5-pentabromodiphenyl ether)	0.123	±	0.013	
BDE-100 (2,2',4,4',6-pentabromodiphenyl ether)	0.060	±	0.006	
BDE-153 (2,2',4,4',5,5'-hexabromodiphenyl ether)	0.069	±	0.008	
BDE-154 (2,2',4,4',5,6'-hexabromodiphenyl ether)	0.109	±	0.008	
BDE-183 (2,2',3,4,4',5',6-heptabromodiphenyl ether)	(0.014)	±	(0.004)	
Extractable fat	(69 %)			

Values in brackets are not certified.

Availability: The CRM is available in glass jars with twist-off lids containing approximately 40g of fish paste and packed in plastic aluminium sachets.

Substance	ERM-CC537a Freshwater sediment			
BDE-28 (2,4,4'-tribromodiphenyl ether)	0.28	±	0.05	µg/kg
BDE-47 (2,2',4,4'-tetrabromodiphenyl ether)	16.5	±	1.8	µg/kg
BDE-99 (2,2',4,4',5-pentabromodiphenyl ether)	34	±	4	µg/kg
BDE-100 (2,2',4,4',6-pentabromodiphenyl ether)	5.8	±	0.6	µg/kg
BDE-153 (2,2',4,4',5,5'-hexabromodiphenyl ether)	6.6	±	0.9	µg/kg
BDE-154 (2,2',4,4',5,6'-hexabromodiphenyl ether)	3.5	±	0.5	µg/kg
BDE-183 (2,2',3,4,4',5',6-heptabromodiphenyl ether)	1.41	±	0.21	µg/kg
BDE-209 (decabromodiphenyl ether)	7.8	±	0.7	mg/kg
α-HBCD (1,2,5,6,9,10-hexabromocyclododecane)	8.3	±	1.6	µg/kg
β-HBCD (1,2,5,6,9,10-hexabromocyclododecane)	2.3	±	0.5	µg/kg
γ-HBCD (1,2,5,6,9,10-hexabromocyclododecane)	60	±	16	µg/kg

Availability: The CRM is available in amber glass bottles (sealed with a shrink film on the cap) containing about 40g of sediment.

## 2 MATERIALS RELATED TO THE ANALYSIS OF FOOD AND FEEDING STUFF

### 2.1 PURE MATERIALS AND SYNTHETIC MIXTURES

BCR-123 Ethanol						
Parameter	Ethanol H		Ethanol M		Ethanol L	
(D/H) <sub>I</sub>	109.65 × 10 <sup>-6</sup>	± 0.20 × 10 <sup>-6</sup>	101.69 × 10 <sup>-6</sup>	± 0.17 × 10 <sup>-6</sup>	90.30 × 10 <sup>-6</sup>	± 0.18 × 10 <sup>-6</sup>
(D/H) <sub>II</sub>	119.76 × 10 <sup>-6</sup>	± 0.25 × 10 <sup>-6</sup>	130.94 × 10 <sup>-6</sup>	± 0.21 × 10 <sup>-6</sup>	122.20 × 10 <sup>-6</sup>	± 0.4 × 10 <sup>-6</sup>
R	2.184	± 0.005	2.575	± 0.006	2.708	± 0.009

Availability: Units of 3 sealed NMR tubes containing respectively H-, M-, and L-ethanols, to which the tetramethylurea internal standard and the C<sub>6</sub>F<sub>6</sub> lock substance are added. 10 mm (BCR-123A) or 15 mm (BCR-123B) O.D. NRM tubes can be supplied.

Parameter	Unit	BCR-656 (96% ethanol)		
(D/H) <sub>I</sub> by <sup>2</sup> H-NMR	ppm	102.84	±	0.20
(D/H) <sub>II</sub> by <sup>2</sup> H-NMR	ppm	132.07	±	0.30
R by <sup>2</sup> H-NMR		2.570	±	0.005
δ <sup>13</sup> C <sub>V</sub> PDB by IRMS	‰	-26.91	±	0.07
Alcoholic grade <sub>td</sub>	w/w %	(94)		

Value in brackets is not certified.

Availability: BCR-656: Units of 25 mL of 96 % vol. neutral ethanol from wine in glass bottle.

Parameter	Unit	BCR-657 (Sugar)		BCR-660 (Ethanol in water)	
(D/H) <sub>I</sub> by <sup>2</sup> H-NMR	ppm			102.90	± 0.16
(D/H) <sub>II</sub> by <sup>2</sup> H-NMR	ppm			131.95	± 0.23
R by <sup>2</sup> H-NMR				2.567	± 0.005
δ <sup>13</sup> C <sub>V</sub> PDB by IRMS	‰	-10.76	± 0.04	-26.72	± 0.09
(D/H) <sub>w</sub> of water (IRMS)	ppm			148.68	± 0.14
Alcoholic grade <sub>td</sub>	w/w %			11.96	± 0.06 <sup>1)</sup>

1) in v/v %

Availability: BCR-657: Units of approx. 1 g of dry glucose in a sealed amber vial;

BCR-660: Units of 370 mL of aqueous ethanol solution in glass bottle.

#### Tetramethylurea (STA-003m)

Tetramethylurea (TMU) which is used as Internal Standard in routine SNIF-NMR analysis is available in 500 mL quantities. The D/H nominal value of tetramethylurea batches is determined by multiple calibration at 61.45/400 MHz, 61.4/400 MHz and 45.05/400 MHz for deuterium and given in an accompanying analytical report.

Substance	BCR-423 (RM) Aflatoxin M <sub>1</sub> in chloroform (µg/mL)	
Aflatoxin M <sub>1</sub>	(9.93)	

Value in brackets is not certified.

Availability: Sealed ampoules containing about 2.5 mL.

Compound	ERM-AC626 Arsenobetaine in water		
	Mass fraction (mg/kg)		
Arsenobetaine	250.0	±	2.5

Availability: ERM-AC626 is available in ampoules containing 1 mL.



Compound	<b>BCR-663</b> Saxitoxin in acetic acid		
	<u>Mass fraction</u> (mg/kg)		
Saxitoxin·2HCl	9.8	±	1.2

Availability: BCR-663 is available in ampoules containing 1 mL.

Substance	<b>ERM-AC699</b> Zearalenone in acetonitrile		
	<u>Mass concentration</u> (µg/mL)		
ZON	9.95	±	0.30

Availability: ERM-AC699 is supplied in ampoules filled and sealed under nitrogen in amounts of 4 mL.

Substance	<b>ERM-AC057</b> Aflatoxin B1 in acetonitrile			
	<u>Mass fraction (µg/g)</u>		<u>Mass concentration at 20 °C (µg/mL)</u>	
Aflatoxin B1	3.79	± 0.11	(2.97	± 0.09)

Values in brackets are not certified.

Availability: ERM-AC057 is supplied in amber glass ampoules filled with 4 mL.

Substance	<b>ERM-AC058</b> Aflatoxin B2 in acetonitrile			
	<u>Mass fraction (µg/g)</u>		<u>Mass concentration at 20 °C (µg/mL)</u>	
Aflatoxin B2	3.80	± 0.08	(2.98	± 0.06)

Values in brackets are not certified.

Availability: ERM-AC058 is supplied in amber glass ampoules filled with 4 mL.

Substance	<b>ERM-AC059</b> Aflatoxin G1 in acetonitrile			
	<u>Mass fraction (µg/g)</u>		<u>Mass concentration at 20 °C (µg/mL)</u>	
Aflatoxin G1	3.78	± 0.13	(2.96	± 0.10)

Values in brackets are not certified.

Availability: ERM-AC059 is supplied in amber glass ampoules filled with 4 mL.

Substance	<b>ERM-AC060</b> Aflatoxin G2 in acetonitrile			
	<u>Mass fraction (µg/g)</u>		<u>Mass concentration at 20 °C (µg/mL)</u>	
Aflatoxin G2	3.80	± 0.07	(2.98	± 0.06)

Values in brackets are not certified.

Availability: ERM-AC060 is supplied in amber glass ampoules filled with 4 mL.

Substance	IRMM-315 4-Deoxynivalenol in acetonitrile	
	Mass fraction (µg/g)	Mass concentration (µg/mL)
4-Deoxynivalenol	25.1 ± 1.2	(19.7 ± 0.9)

Values in brackets are not certified.

Availability: IRMM-315 is supplied in amber glass ampoules filled with 4 mL.

Substance	IRMM-316 Nivalenol in acetonitrile	
	Mass fraction (µg/g)	Mass concentration (µg/mL)
Nivalenol	24.0 ± 1.1	(18.8 ± 0.9)

Values in brackets are not certified.

Availability: IRMM-316 is supplied in amber glass ampoules filled with 4 mL.

## 2.2 MATRIX MATERIALS

### 2.2.1 CERTIFIED FOR GMO CONTENT

The materials were prepared by quantitative mixing of non-genetically modified powder and genetically modified powder, produced from ground seed with the help of a dry-mixing technique, and are intended for the calibration of methods for the detection of genetically modified food.

#### CRMs for genetically modified GTS 40-3-2 soya beans (ERM-BF410p)

Five CRMs of dried soya bean powder with different mass fractions of genetically modified (GTS 40-3-2) soya beans were produced.

	Certified value GTS 40-3-2 mass fraction (g/kg)	Uncertainty (g/kg)
ERM-BF410ap	< 0.09	-
ERM-BF410bp	> 985	-
ERM-BF410cp	1.00	0.10
ERM-BF410dp	10.0	0.6
ERM-BF410ep	100	5

Availability: Vials containing about 1 g of soya bean powder.

#### CRMs for genetically modified Bt-176 maize (ERM-BF411)

Six CRMs of dried maize powder with different mass fractions of genetically modified (Bt-176) maize were produced.

	Certified value Bt-176 mass fraction (g/kg)	Uncertainty (g/kg)
ERM-BF411a	< 0.14	-
ERM-BF411b	1.00	0.29
ERM-BF411c	5.0	0.6
ERM-BF411d	10.0	0.8
ERM-BF411e	20.0	1.1
ERM-BF411f	50.0	1.8

Availability: Vials containing about 1 g of maize powder.

### CRMs for genetically modified Bt-11 maize (ERM-BF412k)

Five CRMs of dried maize powder with different mass fractions of genetically modified (Bt-11) maize were produced.

	Certified value Bt-11 mass fraction (g/kg)	Uncertainty (g/kg)
ERM-BF412ak	< 0.12	-
ERM-BF412bk	> 970	-
ERM-BF412ck	0.99	0.13
ERM-BF412dk	9.9	0.7
ERM-BF412ek	99	4

Availability: Vials containing about 1 g of maize powder.

### CRMs for genetically modified MON 810 maize (ERM-BF413k)

Four CRMs of dried maize powder with different mass fractions of genetically modified (MON 810) maize were produced.

	Certified value MON 810 mass fraction (g/kg)	Uncertainty (g/kg)
ERM-BF413ak	< 0.9	-
ERM-BF413ck	4.9	1.0
ERM-BF413ek *	19.8	1.5
ERM-BF413gk	99	5

Availability: Vials containing about 1 g of maize powder.

\* ERM-BF413ek is also certified for the DNA copy number ratio.

	Certified value MON 810 DNA copy number ratio (%)	Uncertainty (%)
ERM-BF413ek	0.77	0.08

	<b>ERM-AD413</b> DNA fragments per plasmid		
	<u>Number</u>		
Fragment of 5' <i>plant-P35S</i> junction DNA/plasmid	1		(negligible uncertainty)
Fragment of <i>hmg</i> DNA/plasmid	1		(negligible uncertainty)
	<u>Number ratio</u>		
Ratio between the number of 5' <i>plant-P35S</i> junction and <i>hmg</i> fragments in the plasmid by duplex rt-PCR <sup>(1)</sup> and simplex rt-PCR <sup>(2)</sup>	(1.00 <sup>1</sup>	±	0.06)
	(1.04 <sup>2</sup>	±	0.06)

Values in brackets are not certified. Availability: ERM-AD413 is available in vials.

### CRMs for genetically modified GA21 maize (ERM-BF414)

Six CRMs of dried maize powder with different mass fractions of genetically modified (GA21) maize were produced.

	Certified value GA21 mass fraction (g/kg)	Uncertainty (g/kg)
ERM-BF414a	< 0.8	-
ERM-BF414b	1.0	0.8
ERM-BF414c	4.9	1.0
ERM-BF414d	9.9	1.1
ERM-BF414e	17.2	1.2
ERM-BF414f	42.9	1.7

Availability: Vials containing about 1 g of maize powder.

### CRMs for genetically modified NK603 maize (ERM-BF415)

Six CRMs of dried maize powder with different mass fractions of genetically modified (NK603) maize were produced.

	Certified value NK603 mass fraction (g/kg)	Uncertainty (g/kg)
ERM-BF415a	< 0.4	-
ERM-BF415b	1.0	0.4
ERM-BF415c	4.9	0.5
ERM-BF415d	9.8	0.7
ERM-BF415e *	19.6	0.9
ERM-BF415f	49.1	1.3

Availability: Vials containing about 1 g of maize powder.

\* ERM-BF415e is also certified for the DNA copy number ratio.

	Certified value NK603 maize DNA copy number ratio (%)	Uncertainty (%)
ERM-BF415e	0.95	0.11

	<b>ERM-AD415</b> DNA fragments per plasmid	
	<u>Number</u>	
Fragment of 3' insertion-specific DNA / pIRMM-0086	1	(negligible uncertainty)
Fragment of <i>hmg</i> DNA / pIRMM-0086	1	(negligible uncertainty)

Availability: ERM-AD415 is available in vials.

### CRMs for genetically modified MON 863 maize (ERM-BF416)

Four CRMs of dried maize powder with different mass fractions of genetically modified (MON 863) maize were produced.

	Certified value MON 863 mass fraction (g/kg)	Uncertainty (g/kg)
ERM-BF416a	< 1.0	-
ERM-BF416b	1.0	- 0.3 ; + 1.0
ERM-BF416c	9.8	- 0.7 ; + 1.2
ERM-BF416d	98.5	- 2.2 ; + 2.5

Availability: Vials containing about 1 g of maize powder.

### CRMs for genetically modified MON 863 x MON 810 maize (ERM-BF417)

Four CRMs of dried maize powder with different mass fractions of genetically modified (MON 863 x MON 810) maize were produced.

	Certified value MON 863 x MON 810 mass fraction (g/kg)	Uncertainty (g/kg)
ERM-BF417a	< 1.0	-
ERM-BF417b	1.0	- 0.2 ; + 1.0
ERM-BF417c	9.8	- 0.7 ; + 1.2
ERM-BF417d	98.5	- 2.0 ; + 2.4

Availability: Vials containing about 1 g of maize powder.

### CRMs for genetically modified 1507 maize (ERM-BF418)

Four CRMs of dried maize powder with different mass fractions of genetically modified (1507) maize were produced.

	Certified value 1507 maize mass fraction (g/kg)	Uncertainty (g/kg)
ERM-BF418a	< 0.5	-
ERM-BF418b	1.0	- 0.2 ; + 0.6
ERM-BF418c	9.9	- 0.6 ; + 0.8
ERM-BF418d	98.6	- 1.7 ; + 2.0

Availability: Vials containing about 1 g of maize powder.

### CRMs for genetically modified H7-1 sugar beet (ERM-BF419)

Two CRMs of dried sugar beet powder with different mass fractions of genetically modified (H7-1) sugar beet were produced.

	Certified value H7-1 sugar beet mass fraction (g/kg)	Uncertainty (g/kg)
ERM-BF419a	0	0
ERM-BF419b	1000	0

Availability: Vials containing about 1 g of sugar beet powder.

### CRMs for genetically modified 3272 maize (ERM-BF420)

Three CRMs of dried maize powder with different mass fractions of genetically modified (3272) maize were produced.

	Certified value 3272 maize mass fraction (g/kg)	Uncertainty (g/kg)
ERM-BF420a	< 1.3	-
ERM-BF420b	9.8	1.2
ERM-BF420c	98	8

Availability: Vials containing about 1 g of maize powder.

### CRMs for genetically modified EH92-527-1 potato (ERM-BF421)

Two CRMs of dried potato powder with different mass fractions of genetically modified (EH92-527-1) potato were produced.

	Certified value Number fraction of EH92-527-1 potato / total number of potatoes [%]	Certified property Identity	Uncertainty
ERM-BF421a	0	potato without the EH92-527-1 event	Not applicable
ERM-BF421b	100	EH92-527-1 potato	

Availability: ERM-BF421a: vials containing about 1 g of potato powder, ERM-BF421b: vials containing about 0.5 g of potato powder.

### CRMs for genetically modified 281-24-236 x 3006-210-23 cotton seed (ERM-BF422)

Four CRMs of dried cotton seed powder with different mass fractions of genetically modified (281-24-236 x 3006-210-23) cotton seed were produced.

	Certified value 281-24-236 x 3006-210-23 cotton seed mass fraction (g/kg)	Uncertainty (g/kg)
ERM-BF422a	< 0.5	-
ERM-BF422b	> 979	-
ERM-BF422c	10.0	1.7
ERM-BF422d	100	16

Availability: Vials containing about 1 g of cotton seed powder.

### CRMs for genetically modified MIR604 maize (ERM-BF423)

Four CRMs of dried maize powder with different mass fractions of genetically modified (MIR604) maize were produced.

	Certified value MIR604 maize mass fraction (g/kg)	Uncertainty (g/kg)
ERM-BF423a	< 0.9	-
ERM-BF423b	1.0	- 0.3 ; + 1.0
ERM-BF423c	9.8	- 0.9 ; + 1.3
ERM-BF423d	98.5	- 2.6 ; + 2.9

Availability: Vials containing about 1 g of maize powder.

### CRMs for genetically modified 59122 maize (ERM-BF424)

Four CRMs of dried maize powder with different mass fractions of genetically modified (59122) maize were produced.

	Certified value 59122 maize mass fraction (g/kg)	Uncertainty (g/kg)
ERM-BF424a	< 1.2	-
ERM-BF424b	1.0	- 0.2 ; + 1.2
ERM-BF424c	9.9	- 0.8 ; + 1.4
ERM-BF424d	98.7	- 5.8 ; + 5.9

Availability: Vials containing about 1 g of maize powder.

### CRMs for genetically modified 356043 soya seed (ERM-BF425)

Four CRMs of dried soya seed powder with different mass fractions of genetically modified soya seed were produced.

	Certified value 356043 soya seed mass fraction (g/kg)	Uncertainty (g/kg)
ERM-BF425a	< 0.5	-
ERM-BF425b	1.0	0.4
ERM-BF425c *	10.0	1.1
ERM-BF425d	100	9

Availability: Vials containing about 1 g of soya seed powder.

\* ERM-BF425c is also certified for the DNA copy number ratio.

	Certified value 356043 soya DNA copy number ratio (%)	Uncertainty (%)
ERM-BF425c	0.85	0.11

Substance	ERM-AD425 DNA fragments per plasmid	
	Number	
Fragment of 5' insert-to-plant junction DNA / pIRMM-0073	1	(negligible uncertainty)
Fragment of <i>le1</i> DNA / pIRMM-0073	1	(negligible uncertainty)

Availability: ERM-AD425 is available in vials.

### CRMs for genetically modified 305423 soya seed (ERM-BF426)

Four CRMs of dried soya seed powder with different mass fractions of genetically modified soya seed were produced.

	Certified value 305423 soya seed mass fraction (g/kg)	Uncertainty (g/kg)
ERM-BF426a	< 0.8	-
ERM-BF426b	5.0	0.8
ERM-BF426c	10.0	1.0
ERM-BF426d	100	7

Availability: Vials containing about 1 g of soya seed powder.

### CRMs for genetically modified 98140 maize (ERM-BF427)

Four CRMs of dried maize seed powder with different mass fractions of genetically modified (98140) maize were produced.

	Certified value 98140 maize seed mass fraction (g/kg)	Uncertainty (g/kg)
ERM-BF427a	< 0.4	-
ERM-BF427b	5.0	0.6
ERM-BF427c *	20.0	0.8
ERM-BF427d	100	4

Availability: Vials containing about 1 g of maize seed powder.

\* ERM-BF427c is also certified for the DNA copy number ratio.

	Certified value 98140 maize DNA copy number ratio (%)	Uncertainty (%)
ERM-BF427c	1.75	0.13

	<b>ERM-AD427</b> DNA fragments per plasmid	
	<u>Number</u>	
Fragment of 5' insert-to-plant junction DNA / pIRMM-0090	1	(negligible uncertainty)
Fragment of <i>hmg</i> DNA / pIRMM-0090	1	(negligible uncertainty)

Availability: ERM-AD427 is available in vials.

### CRMs for genetically modified GHB119 cotton (ERM-BF428)

Three CRMs of dried cotton seed powder with different mass fractions of genetically modified (GHB119) cotton were produced.

	Certified value GHB119 cotton seed mass fraction (g/kg)	Uncertainty (g/kg)
ERM-BF428a	< 0.2	-
ERM-BF428b	10	4
ERM-BF428c	100	11

Availability: Vials containing about 1 g of cotton seed powder.

### CRMs for genetically modified T304-40 cotton (ERM-BF429)

Three CRMs of dried cotton seed powder with different mass fractions of genetically modified (T304-40) cotton were produced.

	Certified value T304-40 cotton seed mass fraction (g/kg)	Uncertainty (g/kg)
ERM-BF429a	< 0.4	-
ERM-BF429b	10	1.3
ERM-BF429c	100	11

Availability: Vials containing about 1 g of cotton seed powder.

### CRMs for genetically modified AM04-1020 potato (ERM-BF430)

Two CRMs for the detection of genetically modified AM04-1020 potato were produced.

	Certified value AM04-1020 potato mass fraction (g/kg)
ERM-BF430a	0

  

	Certified identity
ERM-BF430b	Positive for event AM04-1020

Availability: Vials containing about 1 g of potato powder.



### CRMs for genetically modified AV43-6-G7 potato (ERM-BF431)

Two CRMs for the detection of genetically modified AV43-6-G7 potato were produced.

	Certified value AV43-6-G7 potato mass fraction (g/kg)
ERM-BF431a	0

  

	Certified identity
ERM-BF431b	Positive for event AV43-6-G7

Availability: Vials containing about 1 g of potato powder.

### CRMs for genetically modified DAS-68416-4 soya seed (ERM-BF432)

Four CRMs of dried soya seed powder with different mass fractions of genetically modified soya seed DAS-68416-4 were produced.

	Certified value DAS-68416-4 soya seed mass fraction (g/kg)	Uncertainty (g/kg)
ERM-BF432a	< 0.3	-
ERM-BF432b	5.0	0.6
ERM-BF432c	10.0	1.7
ERM-BF432d	100	13

Availability: Vials containing about 1 g of soya seed powder.

### CRMs for genetically modified DAS-40278-9 maize (ERM-BF433)

Four CRMs of dried maize powder with different mass fractions of genetically modified DAS-40278-9 maize were produced.

	Certified value DAS-40278-9 maize mass fraction (g/kg)	Uncertainty (g/kg)
ERM-BF433a	< 0.3	-
ERM-BF433b	5.0	0.6
ERM-BF433c	10.0	0.9
ERM-BF433d	100	8

Availability: Vials containing about 1 g of maize powder.

### CRMs for genetically modified 73496 rapeseed (ERM-BF434)

Five CRMs of dried rapeseed powder with different mass fractions of genetically modified rapeseed 73496 were produced.

	Certified value 73496 rapeseed mass fraction (g/kg)	Uncertainty (g/kg)
ERM-BF434a	< 0.04	-
ERM-BF434b	>988	-
ERM-BF434c	1.00	0.15
ERM-BF434d	10.0	1.4
ERM-BF434e	100	12

Availability: Vials containing about 1 g of rapeseed powder.

### CRMs for genetically modified PH05-026-0048 potato (ERM-BF435)

Two CRMs for the detection of genetically modified PH05-026-0048 potato were produced.

	Certified value PH05-026-0048 potato mass fraction (g/kg)
ERM-BF435a	< 0.4

  

	Certified identity
ERM-BF435b	Positive for event PH05-026-0048

Availability: Vials containing about 1 g of potato powder

### CRMs for genetically modified DAS-44406-6 soya seed (ERM-BF436)

Five CRMs of dried soya seed powder with different mass fractions of genetically modified soya seed DAS-44406-6 were produced.

	Certified value DAS-44406-6 soya seed mass fraction (g/kg)	Uncertainty (g/kg)
ERM-BF436a	< 0.06	-
ERM-BF436b	>986	-
ERM-BF436c	1.00	0.14
ERM-BF436d	10.0	1.0
ERM-BF436e	100	9

Availability: Vials containing about 1 g of soya seed powder.

### CRMs for genetically modified DAS-81419-2 soya seed (ERM-BF437)

Five CRMs of dried soya seed powder with different mass fractions of genetically modified soya seed DAS-81419-2 were produced.

	Certified value DAS-81419-2 soya seed mass fraction (g/kg)	Uncertainty (g/kg)
ERM-BF437a	< 0.07	-
ERM-BF437b	>986	-
ERM-BF437c	0.99	0.12
ERM-BF437d	9.9	1.5
ERM-BF437e	100	9

Availability: Vials containing about 1 g of soya seed powder.

### CRMs for genetically modified VCO-Ø1981-5 maize (ERM-BF438)

Five CRMs of dried maize powder with different mass fractions of genetically modified VCO-Ø1981-5 maize were produced.

	Certified value VCO-Ø1981-5 maize mass fraction (g/kg)	Uncertainty (g/kg)
ERM-BF438a	< 0.06	-
ERM-BF438b	>986	-
ERM-BF438c	1.00	0.13
ERM-BF438d	10.0	0.8
ERM-BF438e	100	5

Availability: Vials containing about 1 g of maize powder.

### CRMs for genetically modified DP-ØØ4114-3 maize (ERM-BF439)

Five CRMs of dried maize powder with different mass fractions of genetically modified DP-ØØ4114-3 maize were produced.

	Certified value DP-ØØ4114-3 maize mass fraction (g/kg)	Uncertainty (g/kg)
ERM-BF439a	< 0.06	-
ERM-BF439b	>986	-
ERM-BF439c	1.00	0.13
ERM-BF439d	10.0	0.8
ERM-BF439e	100	5

Availability: Vials containing about 1 g of maize powder.

### CRMs for genetically modified DAS-81910-7 cotton (ERM-BF440)

Five CRMs of dried cotton seed powder with different mass fractions of genetically modified (DAS-81910-7) cotton were produced.

	Certified value DAS-81910-7 cotton seed mass fraction (g/kg)	Uncertainty (g/kg)
ERM-BF440a	< 0.07	-
ERM-BF440b	>986	-
ERM-BF440c	1.00	0.08
ERM-BF440d	10.0	0.8
ERM-BF440e	100	7

Availability: Vials containing about 1 g of cotton seed powder.

## 2.2.2 CERTIFIED FOR NATURAL TOXINS AND XENOBIOTICS

Substance	BCR-459 Coconut oil (µg/kg)
Pyrene	< 0.9
Chrysene	< 0.6
Benzo[k]fluoranthene	< 0.2
Benzo[a]pyrene	< 0.3
Benzo[ghi]perylene	< 0.2
Indeno[1,2,3-cd]pyrene	< 0.2

Availability: BCR-459 is provided in ampoules containing approximately 45 g.

Polychlorinated biphenyls (IUPAC No.)	BCR-450 Natural milk powder (µg/kg)	ERM-BB444 Natural pork fat (blank) (µg/kg)	ERM-BB445 Spiked pork fat (very low level) (µg/kg)	ERM-BB446 Spiked pork fat (low level) (µg/kg)
28		< 2	14.8 ± 1.3	29.6 ± 2.1
52	1.16 ± 0.17	< 2	12.9 ± 0.9	25.5 ± 1.8
101		< 2	12.5 ± 1.2	30 ± 4
118	3.3 ± 0.4	< 2	12.7 ± 1.3	30.2 ± 2.7
138		< 2	14.6 ± 1.6	32 ± 4
153	19.0 ± 0.7	< 2	13.1 ± 1.1	30.8 ± 2.4
156	1.62 ± 0.20			
170	4.8 ± 0.6			
180	11.0 ± 0.7	< 2	12.6 ± 0.9	29.8 ± 2.5
sum (28, 52, 101, 118, 138, 153, 180)		< 14	93 ± 7	207 ± 11
*PDBE 47 γ-HCH (lindane)		(3.7) (5.7)	(3.9) (5.6)	(6.1) (4.6)

\* 2,2',4,4'-Tetrabromo-diphenylether. / Values in brackets are not certified.

Availability: BCR-450 in brown glass bottles of about 20 g. ERM-BB444 to 446 in glass ampoules of about 5 g.

Polychlorinated biphenyls (IUPAC No.)	BCR-349 Cod liver oil (µg/kg)	ERM-BB350 Fish oil (ng/g)
28	68 ± 8	21.3 ± 1.1
52	149 ± 21	37.4 ± 2.2
74		23.0 ± 1.9
95		(38 ± 47)
99		62 ± 6
101	372 ± 18	111 ± 5
105		25.8 ± 2.1
110		54.1 ± 2.8
118	460 ± 40	84 ± 4
138		137 ± 10
149		88 ± 9
153	940 ± 40	220 ± 11
156		20.1 ± 1.3
163		(43 ± 73)
167		(17 ± 27)
177		25.8 ± 2.0
180	282 ± 23	67 ± 4
183		22.5 ± 1.8
187		67 ± 5
194		23.4 ± 1.5
196		41 ± 7

Values in brackets are not certified.

Availability: BCR-349 and ERM-BB350 are provided in sealed glass ampoules containing approximately 2 g fish oil.

Substance	BCR-598 Cod liver oil (µg/kg)
HCB	55.7 ± 2.0
α-HCH	42 ± 3
β-HCH	16 ± 3
γ-HCH	23 ± 4
γ-Chlordane	6.9 ± 1.6
α-Chlordane	24.4 ± 1.8
Oxychlordane	11.0 ± 1.8
Transnonachlor	39 ± 4
Dieldrin	59 ± 4
p,p',-DDE	0.61 × 10 <sup>3</sup> ± 0.04 × 10 <sup>3</sup>
o,p',-DDD	30 ± 4
p,p',-DDD	0.40 × 10 <sup>3</sup> ± 0.03 × 10 <sup>3</sup>
p,p',-DDT	0.179 × 10 <sup>3</sup> ± 0.018 × 10 <sup>3</sup>

Availability: BCR-598 is provided in sealed glass ampoules containing approximately 5 g under dry argon.

Substance	ERM-BB430		
	Pork fat (mg/kg)		
HCB	0.193	±	0.017
α-HCH	0.25	±	0.04
β-HCH	0.109	±	0.010
γ-HCH	(1.87)	±	(0.31)
β-HEPO	0.213	±	0.016
Dieldrin	(0.21)	±	(0.05)
Endrin	(0.055)	±	(0.016)
p,p',-DDT	0.48	±	0.07
p,p',-DDD	0.222	±	0.022
p,p',-DDE	0.38	±	0.09

Values in brackets are not certified.

Availability: ERM-BB430 is provided in sealed amber glass ampoules containing approximately 5 g of material bottled under argon.

Substance	BCR-115		
	Animal feed (mg/kg)		
HCB	0.019 4	±	0.001 4
β-HCH	0.023 4	±	0.002 6
γ-HCH	0.021 8	±	0.002 0
Heptachlor	0.019 0	±	0.001 5
γ-Chlordane	0.048	±	0.006
α-Endosulfan	0.046	±	0.004
Dieldrin	0.018 1	±	0.002 3
Endrin	0.046	±	0.006
p,p',-DDE	0.047	±	0.004

Availability: BCR-115 is provided in sealed hard glass ampoules containing approximately 30 g under dry N<sub>2</sub>. The sample is a homogeneous animal feed obtained from commonly used ingredients and enriched with organochlorine pesticides.

Substance	BCR-187		BCR-188	
	Milk powder (µg/kg)		Milk powder (spiked) (µg/kg)	
HCB	1.45	± 0.21	37.4	± 2.7
β-HCH			12.0	± 1.2
γ-HCH		(> 3.6)		(> 25)
β-HEPO			32.0	± 1.9
p,p',-DDE	6.6	± 0.6	51	± 4
Dieldrin			36.1	± 2.5
Endrin			6.2	± 0.9
p,p',-DDT			69	± 5

Values in brackets are not certified.

Availability: The samples are provided in sealed hard glass ampoules containing about 20 g (under Argon).

Substance	BCR-607		
	Natural spray dried milk powder (ng/kg)		
2,3,7,8 - T <sub>4</sub> CDD (D48)	0.25	±	0.03
1,2,3,7,8 - P <sub>5</sub> CDD (D54)	0.79	±	0.04
1,2,3,4,7,8 - H <sub>6</sub> CDD (D66)	0.42	±	0.07
1,2,3,6,7,8 - H <sub>6</sub> CDD (D67)	0.98	±	0.11
1,2,3,7,8,9 - H <sub>6</sub> CDD (D70)	0.34	±	0.05
2,3,7,8 - T <sub>4</sub> CDF (F83)	0.05	±	0.03
1,2,3,7,8 - P <sub>5</sub> CDF (F94)	0.054	±	0.013
2,3,4,7,8 - P <sub>5</sub> CDF (F114)	1.81	±	0.13
1,2,3,4,7,8 - H <sub>6</sub> CDF (F118)	0.94	±	0.04
1,2,3,6,7,8 - H <sub>6</sub> CDF (F121)	1.01	±	0.09
2,3,4,6,7,8 - H <sub>6</sub> CDF (F130)	1.07	±	0.05

Availability: Amber glass bottles containing approximately 100 g.

Substance	<b>ERM-BC190</b> Rapeseed (colza)	<b>ERM-BC366</b> Rapeseed (colza)	<b>ERM-BC367</b> Rapeseed (colza)
	<u>Certified values</u>	<u>Certified values</u>	<u>Certified values</u>
Total glucosinolate content	23 ± 4 mmol/kg	11.9 ± 1.3 mmol/kg	99 ± 9 mmol/kg
Sulphur content	4.72 ± 0.22 g/kg	3.31 ± 0.17 g/kg	10.3 ± 0.5 g/kg

Availability: 20 g whole seed in an aluminium plastic laminated sachet sealed under nitrogen.

Substance	<b>BCR-262R</b> Defatted peanut meal (blank)	<b>BCR-263R</b> Defatted peanut meal (medium level)	<b>BCR-264</b> Defatted peanut meal (high level)	<b>BCR-375</b> Compound feed (very low level blank)	<b>ERM-BE375</b> Compound feed (very low level)	<b>ERM-BE376</b> Compound feed (high level)
	<u>Mass fraction</u> (µg/kg)	<u>Mass fraction</u> (µg/kg)	<u>Mass fraction</u> (µg/kg)	<u>Mass fraction</u> (µg/kg)	<u>Mass fraction</u> (µg/kg)	<u>Mass fraction</u> (µg/kg)
Aflatoxin B1	< 3	17.1 ± 2.4	206 ± 13	< 1	2.6 ± 0.4	12.9 ± 1.8
Aflatoxin B2		3.0 ± 0.4			0.20 ± 0.04	0.68 ± 0.10
Aflatoxin G1		3.0 ± 0.5			0.40 ± 0.10	5.2 ± 0.8
Aflatoxin G2		(0.62 ± 0.21)			< 0.2	
Sum of aflatoxin B1, B2, G1 and G2		(23.7 ± 2.5)				

Values in brackets are not certified.

Availability: Sachets sealed under vacuum containing about 100 g (BCR-263R) and about 150 g (BCR-264) of finely ground defatted peanut meal.

BCR-262R is available in 280 mL amber glass bottles containing about 100 g of the peanut meal, additionally sealed in foil-laminate sachet.

BCR-375 is supplied in units of about 50 g of a finely ground compound feed, ERM-BE375 and ERM-BE376 consist of 2 bottles filled with about 75 g of compound feedingstuff each.

Substance	<b>BCR-401R</b> Peanut butter (very low level)	<b>BCR-385R</b> Peanut butter (low level)	<b>ERM-BD286</b> Paprika powder
	<u>Mass fraction</u> (µg/kg)	<u>Mass fraction</u> (µg/kg)	<u>Mass fraction</u> (µg/kg)
Aflatoxin B1	< 0.2	1.77 ± 0.30	3.72 ± 0.29
Aflatoxin B2	< 0.2	0.48 ± 0.08	
Aflatoxin G1	< 0.2	0.9 ± 0.4	2.4 ± 0.6
Aflatoxin G2	< 0.2	0.30 ± 0.12	
Total		3.5 ± 0.5	

Availability: The samples are supplied in units of about 100 g in aluminium cans

	Description	Aflatoxin M <sub>1</sub> (µg/kg)
<b>ERM-BD282</b>	Whole milk powder (zero level)	< 0.02
<b>ERM-BD283</b>	Whole milk powder (low level)	0.111 ± 0.018
<b>ERM-BD284</b>	Whole milk powder (high level)	0.44 ± 0.06

Availability: The materials are provided in units of 30 g in amber glass bottles filled and sealed under nitrogen.

Substance	<b>BCR-377</b> Maize Flour (very low level blank)	<b>BCR-396</b> Wheat Flour (very low level blank)
	<u>Mass fraction</u> (mg/kg)	<u>Mass fraction</u> (mg/kg)
DON	< 0.05	< 0.05

Availability: Sachets sealed under vacuum containing about 150 g of sealed finely ground flour.

Substance	<b>BCR-471</b> Wheat (blank)
Ochratoxin A	<u>Mass fraction</u> (µg/kg) < 0.6

Availability: Units of about 55 g in foil-laminate pouches sealed under vacuum.

Compound	<b>BCR-543</b> Mussel
Saxitoxin·2HCl Saxitoxin·2HCl (if enriched with BCR-663) dc-saxitoxin	<u>Mass fraction</u> (mg/kg) < 0.07 0.48 ± 0.06 < 0.04

Availability: BCR-543 is available in heat-sealed laminate sachets containing about 15 g of material each. BCR-663 is available in ampoules containing 1 mL.

Substance	<b>ERM-BC716</b> Maize	<b>ERM-BC717</b> Maize
DON NIV ZON	<u>Mass fraction</u> (µg/kg) < 5	<u>Mass fraction</u> (µg/kg) 673 ± 87 53 ± 10 83 ± 9

Availability: ERM-BC716 and ERM-BC717 are supplied in sachets containing at least 60 g.

### IRMM-359: Staphylococcus aureus enterotoxin A (SEA) in cheese

IRMM-359	Diagnostic specificity	
	Certified value [%]	One-sided lower confidence limit [%]
<b>IRMM-359a</b>	100	97.3
<b>IRMM-359b</b>	100	97.5
<b>IRMM-359c</b>	100	97.6

Availability: Provided in a set of IRMM-359a, IRMM-359b and IRMM-359c, in plastic sachets protected in an alumina pouch.

Compound	<b>ERM-BC403</b> Cucumber
	<u>Mass fraction (mg/kg)</u>
Acetamiprid	0.064 ± 0.004
Azoxystrobin	0.639 ± 0.030
Carbendazim	0.074 ± 0.004
Chlorpyrifos	0.064 ± 0.005
Cypermethrin	0.045 ± 0.007
Diazinon	0.051 ± 0.004
α-Endosulfan	0.031 ± 0.006
Fenitrothion	0.054 ± 0.007
Imazalil	0.044 ± 0.004
Imidacloprid	0.627 ± 0.026
Iprodione	0.57 ± 0.05
Malathion	0.052 ± 0.007
Methomyl	0.059 ± 0.004
Tebuconazole	0.0611 ± 0.0026
Thiabendazole	0.056 ± 0.003

Availability: ERM-BC403 is available in sets of two glass vials containing each approximately 3.2 g of dried cucumber.

Compound	ERM-BC700 Soya bean		
	Mass fraction (mg/kg)		
Azoxystrobin	0.46	±	0.05
Carbendazim	0.197	±	0.019
Chlorpyrifos	0.067	±	0.006
Cypermethrin	0.052	±	0.010
Diazinon	0.068	±	0.006
Dieldrin	0.075	±	0.007
( $\alpha$ + $\beta$ )-Endosulfan	0.49	±	0.05
Imidacloprid	0.075	±	0.009
Iprodione	0.104	±	0.015
Methomyl	0.046	±	0.006
Tebuconazole	0.048	±	0.005
$\alpha$ -Endosulfan	( 0.08 – 0.15 )		
$\beta$ -Endosulfan	( 0.28 – 0.47 )		

Values in brackets are not certified.

Availability: ERM-BC700 is available in a glass vial containing 32 g of cryo-milled soya bean powder in an atmosphere of dry nitrogen.

### 2.2.3 CERTIFIED FOR THE TOTAL ELEMENT CONTENT

Substance	ERM-BD150 Skimmed milk powder			ERM-BD151 Skimmed milk powder		
	(g/kg)			(g/kg)		
Ca	13.9	±	0.8	13.9	±	0.7
Cl	9.7	±	2.0	9.8	±	1.2
K	17.0	±	0.7	17.0	±	0.8
Mg	1.26	±	0.10	1.26	±	0.07
Na	4.18	±	0.19	4.19	±	0.23
	(mg/kg)			(mg/kg)		
Cd	0.0114	±	0.029	0.106	±	0.013
Cu	1.08	±	0.06	5.00	±	0.23
Fe	4.6	±	0.5	53	±	4
Hg	0.060	±	0.007	0.52	±	0.04
I	1.73	±	0.14	1.78	±	0.17
Mn	0.289	±	0.018	0.29	±	0.03
Pb	0.019	±	0.004	0.207	±	0.014
Se	0.188	±	0.014	0.19	±	0.04
Zn	44.8	±	2.0	44.9	±	2.3

Availability: Glass bottles containing 20 g of skimmed milk powder.

Substance	ERM-BB184 Bovine muscle (mg/kg)	ERM-BB185 Bovine liver (mg/kg)	ERM-BB186 Pig kidney (mg/kg)	ERM-BB422 Fish muscle (mg/kg)	BCR-185R Bovine liver (mg/kg)
As	0.0234 ± 0.0026	0.0177 ± 0.0021	(0.008 ± 0.006)	12.7 ± 0.7	0.0330 ± 0.0029
Cd	0.0022 ± 0.0004	0.280 ± 0.014	1.09 ± 0.05	0.0075 ± 0.0018	0.544 ± 0.017
Cu	2.31 ± 0.09	598 ± 22	36.5 ± 1.8	1.67 ± 0.16	277 ± 5
Fe	75 ± 4	-	255 ± 13	9.4 ± 1.4	-
Hg	(0.0018 ± 0.0010)	-	(0.023 ± 0.011)	0.601 ± 0.030	-
I	-	-	-	1.4 ± 0.4	-
Mn	0.276 ± 0.013	13.1 ± 0.5	7.26 ± 0.25	0.368 ± 0.028	11.07 ± 0.29
Pb	-	0.0326 ± 0.0021	0.040 ± 0.005	-	0.172 ± 0.009
Se	0.45 ± 0.04	2.99 ± 0.18	10.3 ± 0.9	1.33 ± 0.13	1.68 ± 0.14
Zn	146 ± 7	143 ± 5	134 ± 5	16.0 ± 1.1	138.6 ± 2.1

Values in brackets are not certified.

Availability: BCR-185R is provided in units of 15 g as lyophilised powders, in screw-capped glass bottles.

ERM-BB184 is provided in units of 7 g as lyophilised powder, in brown-glass vials.

ERM-BB186 is provided in units of 10 g as lyophilised powders, in brown-glass vials.

ERM-BB186 and ERM-BB422 are provided in units of 10 g as lyophilised powders, in brown-glass vials.



Substance	BCR-191 Brown bread		
Cd	μg/kg	28.4	± 1.4
Cu	mg/kg	2.63	± 0.07
Fe	mg/kg	40.7	± 2.3
Mn	mg/kg	20.3	± 0.7
Pb	μg/kg	187	± 14
Zn	mg/kg	19.5	± 0.5

Availability: BCR-191 is provided in units of 25 g.

Substance	IRMM-804 Rice flour (mg/kg)		
As		0.049	± 0.004
Cd		1.61	± 0.07
Cu		2.74	± 0.24
Mn		34.2	± 2.3
Pb		0.42	± 0.07
Zn		23.1	± 1.9

Availability: Amber glass bottles containing about 15 g of powdered material.

Substance	BCR-273 Single cell protein (mg/g)			BCR-274 Single cell protein (μg/g)		
	As			0.132	±	0.014
Ca	11.97	±	0.14			
Cd			0.030	±	0.002	
Co			0.039	±	0.003	
Cu			13.1	±	0.4	
Fe	0.156	±	0.004			
K	2.22	±	0.05			
Mn			51.9	±	1.2	
N	121.6	±	0.8			
P	26.8	±	0.4			
Pb			0.044	±	0.010	
Se			1.03	±	0.05	
Zn			42.7	±	1.0	

Availability: BCR-273 and BCR-274 are provided in units of 10 g as a dry powder in sealed glass ampoules.

Substance	BCR-679 White cabbage		
B	mg/kg	(27.7	± 1.9)
Ba	mg/kg	(10.3	± 0.6)
Ca	mg/kg	(7768	± 655)
Cd	mg/kg	1.66	± 0.07
Cr	mg/kg	(0.6	± 0.1)
Cu	mg/kg	2.89	± 0.12
Fe	mg/kg	55.0	± 2.5
Hg	μg/kg	6.3	± 1.4
Mg	mg/kg	(1362	± 127)
Mn	mg/kg	13.3	± 0.5
Mo	mg/kg	14.8	± 0.5
Ni	mg/kg	27.0	± 0.8
P	mg/kg	(3307	± 241)
Sb	μg/kg	20.6	± 2.6
Sr	mg/kg	11.8	± 0.4
Tl	μg/kg	3.0	± 0.3
Zn	mg/kg	79.7	± 2.7

Values in brackets are not certified.

Availability: BCR-679 is provided in units of 15 g.

Substance	ERM-BC381 Rye Flour	ERM-BC382 Wheat Flour	BCR-383 Haricots Verts (Beans)	ERM-BB384 Lyophilised pork muscle
<b>Major components (g / 100 g)</b>				
Glucose			(12.4)	
Fructose			(4.6)	
Sucrose			(1.0)	
N (Kjeldahl)	1.562 ± 0.014	1.851 ± 0.017	1.05 ± 0.04	14.2 ± 0.4
Fat	1.36 ± 0.16	1.39 ± 0.17		8.99 ± 0.20
Starch <sup>1)</sup>	72.2 ± 1.9	81.2 ± 1.7		
Starch & Sugars <sup>2)</sup>			(78.9)	
Dietary Fibre (Englyst)			(10.9)	
Dietary Fibre (AOAC 1985/1988) <sup>3)</sup>			11.9 ± 0.6	
Ash at 550 °C	1.08 ± 0.11	0.60 ± 0.10	2.39 ± 0.10	4.51 ± 0.19
<b>Essential elements (g/kg)</b>				
Ca	0.32 ± 0.04	0.210 ± 0.018	2.85 ± 0.23	0.164 ± 0.021
K	3.35 ± 0.11	1.88 ± 0.08	7.8 ± 0.4	
Mg	0.567 ± 0.013	0.247 ± 0.010	(0.9)	1.03 ± 0.04
Na			0.075 ± 0.007	1.86 ± 0.15
P	2.01 ± 0.07	1.19 ± 0.07	(1.8)	8.7 ± 0.5

Values in brackets are not certified.

Availability: ERM-BC381 and ERM-BC382: 100 ml amber vial containing 37 g flour; ERM-BB384: 2 vials of 9 g lyophilised material; BCR-383: 100 g of powdered material in food grade laminated plastic/aluminium sachets sealed under nitrogen.

<sup>1)</sup> Mass fraction of polysaccharide in dry matter

<sup>2)</sup> Mass fraction of monosaccharides in dry matter

<sup>3)</sup> Prosky L. et al., J Assoc Off Anal Chem (1985) 68: 677-679, (1988) 71: 1017-1023

Substance	ERM-BD512 Dark chocolate (mg/kg)
Cd mg/kg	0.302 ± 0.013
Cu mg/kg	14.3 ± 0.7
Mn mg/kg	15.7 ± 0.6
Ni mg/kg	3.01 ± 0.23

Availability: The sample consists of 6 chocolate pellets of about 0.5 g each packaged in individual brown glass vials within an aluminised sachet

Substance	ERM-CE101 Trout muscle (mg/kg)
Hg	0.0219 ± 0.0027
As	0.175 ± 0.017
Fe	3.1 ± 0.6
Mn	0.108 ± 0.017
Ni	(0.051) ± 0.012
Se	0.113 ± 0.011
Zn	4.5 ± 0.6

Values in brackets are not certified.

Availability: CRM consists of 40 g of homogenised, heat-treated fish muscle contained in a glass jar.

## 2.2.4 CERTIFIED FOR PROXIMATES AND CONVENTIONAL PROPERTIES

Substance		BCR-162R Soya-maize oil blend		
<u>Methyl ester of</u>		<u>Mass fraction fatty acid methyl ester / Total fatty acid methyl ester (g/100 g)</u>		
16:0	n-hexadecanoic acid	10.74	±	0.16
18:0	n-octadecanoic acid	2.82	±	0.04
18:1	n-octadecenoic acids		(26.5)	
18:2	n-octadecadienoic acids		(54.68)	
18:3	n-octadecatrienoic acids		(3.80)	
9c-18:1	n-octadecenoic acid	25.4	±	0.4
9c,12c-18:2	n-octadecadienoic acid	54.13	±	0.25
9c,12c,15c-18:3	n-octadecatrienoic acid	3.35	±	0.05

Values in brackets are not certified.

Availability: Each unit contains approximately 5.5 g soya-maize oil blend in 10 mL amber ampoule.

Substance		BCR-163 Beef-pork fat oil blend		
<u>Methyl ester of</u>		<u>Mass fraction fatty acid methyl ester / Total fatty acid methyl ester <sup>1)</sup> (g/100 g)</u>		
14:0	n-tetradecanoic acids	2.29	±	0.04
16:0	n-hexadecanoic acids	25.96	±	0.30
16:1	n-hexadecenoic acids	2.58	±	0.16
18:0	n-octadecanoic acids	18.29	±	0.17
18:1	n-octadecenoic acids	38.3	±	0.4
18:2	n-octadecadienoic acids	7.05	±	0.17
18:3	n-octadecatrienoic acids	0.86	±	0.14
<u>Sterols</u>		<u>Mass fraction (mg/100 g) in fat</u>		
Cholesterol		134	±	5

Availability: In units of 2 × 5 mL in dark glass ampoules sealed under nitrogen.

1) Includes any geometric (i.e. cis/trans) and positional isomers, expressed as mass fraction of total fatty acid (methyl esters) derived from triglycerides.

2) These components are included in the Certified Value for this group of fatty acids.

The report gives additional indicative values: Fatty Acids and "Total" Sterol Mass Fraction.

Component	BCR-633 Tracers in anhydrous butter fat (mg/kg)		
$\beta$ -Apo-8'-carotenic acid ethyl ester	26.5	±	1.4
$\beta$ -Sitosterol	530	±	29
Stigmasterol	147	±	11
n-Heptanoic acid triglyceride	$1.06 \times 10^3$	±	$0.04 \times 10^3$

Availability: BCR-633 is supplied in units of about 5 g each in amber glass ampoules, which were filled under inert gas conditions (nitrogen).

Component	IRMM-801 Cocoa Butter (%)		
1,3-dipalmitoyl-2-oleyl-glycerol	18.14	±	0.26
1-palmitoyl-2-oleoyl-3-stearoyl-glycerol	44.68	±	0.30
1,2-dioleoyl-3-palmitoyl-glycerol	2.26	±	0.16
1,3-distearoyl-2-oleoyl-glycerol	31.63	±	0.29
1,2-dioleoyl-3-stearoyl-glycerol	3.29	±	0.17

Availability: IRMM-801 is supplied in units of 5 g in brown amber glass ampoules sealed under argon/helium.

	<b>BCR-121</b> Wholemeal flour (mg/kg)	<b>BCR-122</b> Margarine (mg/kg)	<b>BCR-431</b> Brussels sprouts (mg/kg)	<b>BCR-485</b> Mixed vegetables (mg/kg)	<b>BCR-487</b> Pig's liver (mg/kg)	<b>ERM-BD600</b> Whole milk powder (mg/kg)
B <sub>1</sub> (thiamin)	4.63 ± 0.39			3.07 ± 0.34	8.6 ± 1.1	4.5 ± 0.6
B <sub>2</sub> (riboflavin)					106.8 ± 5.6	16.7 ± 1.4
B <sub>6</sub> (total pyridoxine)	4.10 ± 1.02			4.8 ± 0.8	19.3 ± 2.9	
B <sub>12</sub> (cyanocobalamin)					1.12 ± 0.09	0.32 ± 0.07
C (total ascorbate)			4830 ± 240			74 ± 11
D <sub>3</sub> (cholecalciferol)		0.125 ± 0.007				
E (tocopherol)		241 ± 12				86 ± 15
Folate (total)	0.50 ± 0.07			3.15 ± 0.28	13.3 ± 1.3	(0.55 ± 0.16)
Niacin			43 ± 3			(8.0 ± 2.8)
Trans-α-carotene				10.5 ± 0.6		
Trans-β-carotene				23.7 ± 1.5		
Total-α-carotene				9.8 ± 0.7		
Total-β-carotene				25.6 ± 1.2		
Lutein				12.5 ± 0.8		
Lutein + zeaxanthin				22.3 ± 1.3		
5-methyltetrahydro- folic acid (5-MTHF)				(2.14 ± 0.42)		

Values in brackets are not certified;

Availability: BCR-121: about 50 g unit size. - BCR-122: can filled with about 200 g.

BCR-431: about 20 g lyophilised and powdered material in food grade plastic/aluminium laminated sachets under nitrogen.

BCR-485: about 25 g unit size. - BCR-487: about 15 g unit size. - ERM-BD600: sachet with about 100 g.

	Description	Amylose mass fraction (g/100 g)
<b>BCR-465</b>	Rice flour (low level)	15.40 ± 0.30
<b>BCR-466</b>	Rice flour (medium level)	23.1 ± 0.5
<b>BCR-467</b>	Rice flour (high level)	27.7 ± 0.8

Availability: 10 g of ground rice flour in vacuum sealed laminated polyester/aluminium/polyethylene sachets.

Substance	<b>BCR-644</b> Artificial foodstuff	<b>BCR-645</b> Artificial foodstuff
<u>Mass fraction on dry mass basis (g / 100 g)</u>		
Fructose	16.2 ± 1.1	
Sucrose	10.81 ± 0.25	26.2 ± 0.8
Lactose	15.85 ± 0.29	27.8 ± 0.6
Starch / glucose	35.1 ± 1.2	25.2 ± 0.9

Availability: BCR-644 and BCR-645 are supplied in units of approximately 50 g in 125 mL amber glass bottles.

	<b>BCR-651</b> Beer (% ethanol v/v)	<b>BCR-652</b> Beer (% ethanol v/v)	<b>BCR-653</b> Wine (% ethanol v/v)
Ethanol	0.505 ± 0.006	0.051 ± 0.002	0.539 ± 0.007

Availability: Amber glass ampoule, flushed with nitrogen, containing 10 mL of sample.

Substance	ERM-BC381 Rye Flour	ERM-BC382 Wheat Flour	BCR-383 Haricots Verts (Beans)	ERM-BB384 Lyophilised pork muscle
<u>Major components (g / 100 g)</u>				
Glucose			(12.4)	
Fructose			(4.6)	
Sucrose			(1.0)	
N (Kjeldahl)	1.562 ± 0.014	1.851 ± 0.017	1.05 ± 0.04	14.2 ± 0.4
Fat	1.36 ± 0.16	1.39 ± 0.17		8.99 ± 0.20
Starch <sup>1)</sup>	72.2 ± 1.9	81.2 ± 1.7		
Starch & Sugars <sup>2)</sup>			(78.9)	
Dietary Fibre (Englyst)			(10.9)	
Dietary Fibre (AOAC 1985/1988) <sup>3)</sup>			11.9 ± 0.6	
Ash at 550 °C	1.08 ± 0.11	0.60 ± 0.10	2.39 ± 0.10	4.51 ± 0.19
<u>Essential elements (g/kg)</u>				
Ca	0.32 ± 0.04	0.210 ± 0.018	2.85 ± 0.23	0.164 ± 0.021
K	3.35 ± 0.11	1.88 ± 0.08	7.8 ± 0.4	
Mg	0.567 ± 0.013	0.247 ± 0.010	(0.9)	1.03 ± 0.04
Na			0.075 ± 0.007	1.86 ± 0.15
P	2.01 ± 0.07	1.19 ± 0.07	(1.8)	8.7 ± 0.5

Values in brackets are not certified.

Availability: ERM-BC381 and ERM-BC382: 100 ml amber vial containing 37 g flour; ERM-BB384: 2 vials of 9 g lyophilised material; BCR-383: 100 g of powdered material in food grade laminated plastic/aluminium sachets sealed under nitrogen.

<sup>1)</sup> Mass fraction of polysaccharide in dry matter

<sup>2)</sup> Mass fraction of monosaccharides in dry matter

<sup>3)</sup> Prosky L. et al., J Assoc Off Anal Chem (1985) 68: 677-679, (1988) 71: 1017-1023

Substance	BCR-685 Skim milk powder (g / 100 g)		
<u>Mass fraction</u>			
Crude protein (Kjeldahl-N x 6.38)	38.2	±	0.4
Fat	0.96	±	0.12

Availability: BCR-685 is supplied in units of about 50 g, in amber glass bottles.

Substance	BCR-708 Dairy feed			
<u>Mass fraction</u>				
Crude protein	240	±	12	g/kg
Crude oils and fats	65	±	8	g/kg
Crude fibre	93	±	14	g/kg
Crude ash	50.0	±	3.0	g/kg
Ca	4.8	±	0.5	g/kg
Cu	37	±	4	mg/kg
Mg	1.47	±	0.22	g/kg
P	4.7	±	0.4	g/kg

Availability: 100 mL amber glass bottle containing about 40 g of material.

Substance	ERM-BC514 Haricot beans (g/kg)	ERM-BC515 Carrot (g/kg)	ERM-BC516 Apple (g/kg)	ERM-BC517 Full fat soya flour (g/kg)	ERM-BD518 Bran breakfast cereal (g/kg)
<u>Dietary Fibres</u>					
Methods used:					
AOAC 1990	256 ± 5	311 ± 6	164 ± 4	126 ± 5	302 ± 8
Englyst (by gas chromatography)	198 ± 10	271 ± 6	137 ± 5	119 ± 7	241 ± 8
Uppsala	237 ± 15	298 ± 11	162 ± 8	128 ± 9	276 ± 18
AOAC 1992 MES-TRIS	259 ± 15	295 ± 4	149 ± 10	124 ± 21	305 ± 6
Englyst (by colorimetry)	201 ± 6	252 ± 12	134 ± 5	123 ± 8	250 ± 11

Availability: ERM-BC514 to BC517 and ERM-BD518 are supplied in units of approximately 25 g in food grade glass bottles sealed under vacuum.

	<b>BCR-537</b> Plastic film A (mg/dm <sup>2</sup> )	<b>BCR-539</b> Plastic film C (mg/dm <sup>2</sup> )
Overall migration by total immersion in olive oil 10 days at 40 °C	8.3 ± 1.0	
Overall migration by single sided cell in olive oil 10 days at 40 °C		
Overall migration by pouch in olive oil 10 days at 40 °C		6.1 ± 1.0

Availability: PET/foil/PE heat sealed pouches containing double thickness sheets of additive free linear low density polyethylene of (33 x 22.5) cm for BCR-537 and (45 x 25) cm for BCR-539.

## 2.2.5 CERTIFIED FOR MICROBIOLOGICAL PROPERTIES

### BCR-528: Capsules filled with milk powder artificially contaminated by *Bacillus cereus* (ATCL 9139)

Procedure		Number of colony forming particles in one analytical portion <sup>1)</sup>	
		Certified value <sup>2)</sup>	95 % confidence limits
MEYP (ISO 7932)	after 24 h incubation	53.4	51.7 - 55.2
MEYP (ISO 7932)	after 48 h incubation	53.7	52.1 - 55.4
PEMBA (L 00.00 – 25) <sup>3)</sup>	after 24 h incubation	55.0	52.8 - 57.4
PEMBA (L 00.00 – 25) <sup>3)</sup>	after 48 h incubation	55.8	53.6 - 58.0

Availability: BCR-528 is provided in containers holding 10 gelatine capsules filled with artificially contaminated milk powder.

1) Number of colony forming particles of *Bacillus cereus* determined in one analytical portion. Analytical portion: A volume of (0.100 ± 0.002) mL from 10 mL peptone saline solution in which one capsule has been reconstituted.

2) This value is the geometric mean of 11 accepted sets of data, independently obtained by 11 laboratories.

3) German Federal Food Law method number.

### ERM-BD001: Milk powder certified for the somatic cell count (SCC)

	Somatic cell count (SCC) [cells/ml]			
	ISO13366-1		ISO13366-1 & ISO13366-2	
ERM-DB001a	64000	± 8000	62000	± 6000
ERM-DB001b	1202000	± 121000	1166000	± 79000

Availability: ERM-BD001 is supplied in a set consisting of 1 bottle of ERM-BD001a and 1 bottle of ERM-BD001b. Each bottle contains 14 g of milk powder in an inert gas atmosphere.

### IRMM-311: Genomic DNA (gDNA) of *Bacillus licheniformis* DSM 5749 in agarose inserts for Pulsed Field Gel Electrophoresis (PFGE)

<i>Sfi</i> I digested DNA fragments in the size interval 50 kb – 90 kb		Fragment length (kb)		
Band no	1	89.6	±	4.7
	2	80.9	±	2.5
	3	75.3	±	2.7
	4	72.2	±	3.5
	5	66.9	±	1.9
	6	64.6	±	2.9
	7	60.3	±	1.3
	8	56.5	±	1.3
	9	53.9	±	1.3
	10	50.6	±	1.3

Availability: Each vial contains one agarose insert of undigested genomic DNA of *Bacillus licheniformis* DSM 5749 for PFGE.

### IRMM-312: Genomic DNA (gDNA) of *Bacillus subtilis* DSM 5750 in agarose inserts for Pulsed Field Gel Electrophoresis (PFGE)

<i>Sfi</i> I digested DNA fragments in the size interval 50 kb – 90 kb		Fragment length (kb)		
Band no	1	89.2	±	0.9
	2	81.4	±	0.8
	3	77.7	±	0.6
	4	62.5	±	1.8
	5	59.5	±	2.1
	6	44.0	±	2.4
	7	29.2	±	2.0
	8	23.6	±	1.3
	9	18.6	±	1.3

Availability: Each vial contains one agarose insert of undigested genomic DNA of *Bacillus subtilis* DSM 5750 for PFGE.

**IRMM-313: Genomic DNA (gDNA) of *Campylobacter coli* (CNET068) and *Campylobacter jejuni* (CNET112) in agarose inserts for Pulsed Field Gel Electrophoresis (PFGE)**

SmaI digested DNA fragments		DNA fragment sizes (kb)		
Fragment no	2	458.8	±	2.0
	3	351.7	±	2.4
	4	303.0	±	2.3
	5	263.2	±	1.9
	6	188.2	±	1.2
	7	173.2	±	1.3
	8	131.1	±	1.5
	9	114.4	±	1.2
	10	95.5	±	1.4
	11	81.2	±	1.7
	12	54.9	±	2.2
	13	40.7	±	1.6
	14	(25.4	±	1.3)
	15	(17.6	±	0.3)
	16	(10.9	±	0.4)

Values in brackets are not certified.

Availability: Each vial contains one agarose plug for PFGE with undigested genomic DNA of *Campylobacter coli* CNET068 and *Campylobacter jejuni* CNET112 embedded.

**ERM-AD624: Certification of the PFGE fragment sizes of *Listeria Monocytogenes* (strain H2446) DNA in agarose plugs**

Listeria monocytogenes Ascl-digested DNA fragments		Certified value (kb)		
Fragment no	1	1106	±	64
	2	462.5	±	2.4
	3	404.1	±	1.9
	4	392.2	±	2.1
	5	249.9	±	1.4
	6	221.5	±	1.4
	7	126.2	±	1.1
	8	109.1	±	1.1
	9	77.8	±	0.9
	10	50.2	±	1.7
	11	43.7	±	2.7

Availability: Each unit consists of one vial containing one agarose plug for PFGE with embedded undigested DNA of *Listeria monocytogenes*.

**IRMM-351: *Escherichia coli* 0157 in material spheres**

	Number of colony forming unit (cfu)		
cfu per material sphere on nutrient agar	4	±	2
cfu per material sphere on enterohemolysin agar	4	±	2

Availability: Each vial contains one material sphere of *Escherichia coli* 0157 (NCTC 12900).

**IRMM-352: *Salmonella enteritidis* in material spheres**

	Number of colony forming unit (cfu)		
cfu per material sphere on nutrient agar	5	±	2
cfu per material sphere on xylose lysine deoxycholate agar	4	±	2

Availability: Each vial contains one material sphere of *Salmonella enteritidis* (NCTC 12694).



### IRMM-354: *Candida albicans* in material spheres

	Number of colony forming unit (cfu)		
cfu per material sphere on nutrient agar	917	±	168
cfu per material sphere on Oxytetracyclin-Glucose-Yeast Extract agar (OGYE)	912	±	173

Availability: Each vial contains one material sphere of *Candida albicans* (NCPF 3179).

### IRMM-355: *Enterococcus faecalis* in material spheres

	Number of colony forming unit (cfu)		
cfu per material sphere on horse blood agar	890	±	135
cfu per material sphere on Slanetz and Bartley agar	823	±	126

Availability: Each vial contains one material sphere of *Enterococcus faecalis* (CIP 106877).

### IRMM-447: Genomic DNA (gDNA) of *Listeria monocytogenes* (strain 4B, NCTC 11994) with certified identity

	Indicative value (µg)		
Mass of genomic DNA <i>Listeria monocytogenes</i> per vial	(1.1	±	0.7)

Values in brackets are not certified.

Availability: Vial containing approximately 1.1 µg genomic DNA in lyophilised form and closed under argon atmosphere.

### IRMM-448: Genomic DNA (gDNA) of *Campylobacter Jejuni* (NCTC 11351) with certified identity

Property			
Identity	Confirmed by <i>ceuE</i> gene		
Mass of genomic DNA per vial (ng)	(71	±	39)

Values in brackets are not certified.

Availability: Vial containing approximately 71 ng genomic DNA in lyophilised form and closed under argon atmosphere.

### IRMM-449: Genomic DNA (gDNA) of *Escherichia coli* O157 (strain EDL 933) with certified identity

	Indicative value (µg)		
Mass of genomic DNA <i>Escherichia coli</i> per vial	(1.3	±	0.7)

Values in brackets are not certified.

Availability: Vial containing approximately 1.3 µg genomic DNA in lyophilised form and closed under argon atmosphere.

## 2.2.6 CERTIFIED FOR VETERINARY DRUGS

	Description	Substance	Hormones in lyophilised bovine urine Mass concentration in reconstituted sample (µg/L)		
			Content	Relevant below the certified value	Relevant above the certified value
<b>BCR-502</b>	Bovine urine	Clenbuterol	< 0.1		
<b>BCR-503</b>	Bovine urine	Salbutamol	< 0.2		
<b>BCR-504</b>	Bovine urine	Clenbuterol	2.5	0.4	0.4
		Salbutamol	2.3	0.6	0.9
		Clenbuterol	6.0	0.5	0.7
		Salbutamol	5.6	1.1	1.9

Value in brackets is not certified.

Availability: Units of lyophilised urine equivalent to about 5.0 mL in vials sealed under nitrogen.

	Description	Substance	Hormones in lyophilised bovine urine Mass concentration in reconstituted sample (µg/kg)		
<b>ERM-BB386<sup>(1)</sup></b>	Bovine urine	Diethylstilboestrol (DES)	< 0.6		
		Dienoestrol (DE)	< 0.6		
		Hexoestrol (HEX)	< 0.4		
<b>ERM-BB389<sup>(2)</sup></b>	Bovine urine	Diethylstilboestrol (DES)	1.1	±	0.5
		Dienoestrol (DE)	5.5	±	1.4
		Hexoestrol (HEX)	6.1	±	0.9

Availability: <sup>(1)</sup> Vial containing approximately 0.36 g lyophilised bovine urine corresponding to 5.20 g of fresh bovine urine.

<sup>(2)</sup> Vial containing approximately 0.31 g lyophilised bovine urine corresponding to 5.18 g of fresh bovine urine.

	Description	Substance	Mass fraction in reconstituted sample (µg/kg)*		
<b>BCR-648</b>	Bovine liver	Clenbuterol	< 0.5		
<b>BCR-649</b>	Bovine liver	Clenbuterol	1.2	±	0.3
<b>BCR-474</b>	Bovine liver	17 $\alpha$ -trenbolone	< 0.5		
<b>BCR-475</b>	Bovine liver	17 $\alpha$ -trenbolone	7.6	±	2.2
<b>BCR-412</b>	Bovine muscle	Diethylstilbestrol	< 0.1		
<b>BCR-673</b>	Bovine eye	Clenbuterol	< 0.5		
<b>BCR-674</b>	Bovine eye	Clenbuterol	9.4	±	1.1

Availability: BCR-648 and -649 are provided in units of 10 g lyophilised bovine liver in vials sealed under argon. BCR-474 and -475 are sold as set and provided in brown glass vials in units of 2.8 g lyophilised liver corresponding to 10 g fresh liver. BCR-412 is provided in brown glass vials as lyophilised bovine muscle in units equivalent to about 5 g of fresh bovine tissue.

BCR-673 and BCR-674 are provided in brown glass vials containing about 0.1 g of material.

	<b>BCR-444</b> Porcine muscle (blank) (µg/kg)	<b>ERM-BB130</b> Pork muscle (µg/kg)
Chloramphenicol	< 0.2	0.230 ± 0.021

Availability: BCR-444 is provided in brown glass vials, ERM-BB130 in an amber glass bottle, each containing about 7 g of lyophilised pork muscle tissue.

	Description	Substance	Mass fraction in reconstituted sample (mg/kg)		
<b>BCR-695</b>	Pig liver	Chlortetracycline	< 0.004		
<b>BCR-696</b>	Pig liver	Chlortetracycline	0.58	±	0.11
<b>BCR-697</b>	Pig muscle	Chlortetracycline	< 0.006		
<b>BCR-706</b>	Pig kidney	Chlortetracycline	< 0.005		
<b>BCR-707</b>	Pig kidney	Chlortetracycline	1.30	±	0.20

Availability: These CRMs are provided in sealed glass vials containing lyophilised tissue equivalent to 5 g of fresh tissue.

	Description	Substance	(µg/kg)		
<b>ERM-BB492</b>	Milk powder	Sum of oxytetracycline and 4-epi-oxytetracycline	101	±	11
<b>ERM-BB493</b>	Milk powder	Sum of oxytetracycline and 4-epi-oxytetracycline	< 5		

Availability: ERM-BB492 and ERM-BB493: Units of approximately 5.5 g of spray-dried partially skimmed milk; sold as set of 1 unit ERM-BB492 and ERM-BB493 each.

	Substance	<b>BCR-725</b> Salmon tissue (µg/kg)		
Flumequine		1170	±	210
Oxolinic acid		600	±	100

Availability: BCR-725 is provided in amber glass vials containing 2.2 g of lyophilised salmon tissue material.

	Substance	<b>ERM-BB125</b> Egg powder (mg/kg)		
Fipronil sulfone		0.060	±	0.005
Sum of fipronil and fipronil sulfone expressed as fipronil		0.058	±	0.005

Availability: ERM-BB125 is provided in glass vials containing 5 g of egg powder in an atmosphere of dry argon..

	ERM-BB124 Pork muscle		
Nitroimidazoles in the reconstituted material	Mass fraction (µg/kg)		
Ronidazole (RNZ)	2.09	±	0.25
Metronidazole (MNZ)	1.93	±	0.15
2-hydroxymethyl-1-methyl-5-nitroimidazole (HMMNI)	0.69	±	0.09
Hydroxymetronidazole (MNZOH)	6.2	±	0.9
Hydroxyipronidazole (IPZOH)	1.67	±	0.12
Dimetridazole (DMZ)	< 0.25		

Availability: ERM-BB124 is provided in amber glass bottles containing 10 g of lyophilised pork muscle tissue.

## 2.2.7 CERTIFIED FOR IDENTITY

### Ewes'/Goats' Curd (BCR-599)

BCR-599 consists of a set of two freeze dried curd materials made from a mixture of ewes' and goats' milk, intended to detect adulteration by cows' milk in cheeses made from ewes' milk, goats' milk and mixtures thereof, according to the reference method described in Commission Regulation (EC) No. 1081/96. The 0 % material is not adulterated, the 1 % material is adulterated milk 1 % of cows' milk.

Availability: BCR-599 is available as a set of two brown glass vials containing each about 15 g of lyophilised curd powder under Argon atmosphere.

### Peanut Test Material Kit (IRMM-481)

The peanut test material is **not** a reference material, because it could not be tested for homogeneity and stability. The intention is to make a standard peanut matrix available to the research community who may wish to conduct wider studies on similar matrices pre-treated in different ways. At present only the nominal particle size and the pre-treatment applied to the peanuts before milling can be guaranteed as well as the tolerances of weighing of  $1.000 \pm 0.015$  g of each variety in the peanut mixture provided in the kit.

	Peanut variety, origin	Peanut treatment	Nominal net weight of peanut powder	Colour code on cap
IRMM-481a	Runners, Argentina	blanched, strong air-roasting	2 g	blue
IRMM-481b	Common Natal, South-Africa	raw, mild air-roasting	2 g	green
IRMM-481c	Virginia, USA,	blanched, strong oil roasting	2 g	gold
IRMM-481d	Virginia, China	blanched, mild oil-roasting	2 g	red
IRMM-481e	Jumbo Runners, USA,	blanched only	2 g	brown
IRMM-481f	Mixture of 481a to 481e	all above	5 g (1 g of each variety 481a – 481e)	silver

Availability: IRMM-481 consists of a kit with six different vials containing non-salted peanut powders with a nominal particle size from 0.5 to 1.0 mm. Five of the vials are filled with approximately 2 g of each variety. The sixth vial contains a mixture of all five varieties provided in IRMM-481a to 481e. All vials have been filled with argon prior to capping to provide a protective atmosphere.

### Calibration kit for the detection of ruminant material in feed by PCR

The calibration kit for ruminant detection by PCR is a certified reference material and should be used to construct calibration curves at low copy number concentration to determine a cut-off value.

	Copy number concentration of the plasmid [cp/µL]		
ERM-AD482a	123	±	30
ERM-AD482b	32	±	7
ERM-AD482c	8	±	3

Availability: ERM-AD482 consists of a kit of three plasmid solutions. Each of the three vials contains approximately 1000 µL of plasmid solution.

## Calibration kit for the detection of porcine material in feed by PCR

The calibration kit for porcine detection by PCR is a certified reference material and should be used to construct calibration curves at low copy number concentration to determine a cut-off value.

	Copy number concentration of the plasmid [cp/μL]		
ERM-AD483a	126	±	30
ERM-AD483b	34	±	6
ERM-AD483c	9	±	3

Availability: ERM-AD483 consists of a kit of three plasmid solutions. Each of the three vials contains approximately 1000 μL of plasmid solution.

## Identity of fish species

	Certified value – Taxon <sup>1</sup>
EURM-020	Hippoglossus hippoglossus (Atlantic halibut)

Availability: EURM-020 is available in glass vials containing at least 200 mg of dried Hippoglossus hippoglossus (Atlantic halibut) powder.

<sup>1</sup> Determined via genetic identification based upon the sequencing results of two specific regions of mitochondrial DNA (also called DNA barcodes): the cytochrome b gene (cytb) and the cytochrome c oxidase subunit I gene (COI).

## 2.2.8 OTHERS

Substance	ERM-BD273 Toasted bread		
	<u>Mass fraction</u> (ng/g)		
Acrylamide	425	±	29

Availability: ERM-BD273 is available in a brown glass vial containing about 30 g of toasted bread powder.

Radionuclide activity concentration at reference date 1 January 2009, 00h00 UTC	IRMM-426 Wild berries (Bq kg <sup>-1</sup> )		
<sup>137</sup> Cs	780	±	70
<sup>90</sup> Sr	153	±	29
<sup>40</sup> K	253	±	25

Availability: IRMM-426 is available in bottles containing about 100 g of material.

### 3 MATERIALS RELATED TO CLINICAL CHEMISTRY

#### 3.1 PURE STANDARDS AND SYNTHETIC MATERIALS

	Description	Purity (%)
<b>BCR-546</b>	Formaldehyde 2,4-dinitrophenylhydrazone	> 99.3
<b>BCR-547</b>	Acetaldehyde 2,4-dinitrophenylhydrazone	98.3 ± 0.5
<b>BCR-548</b>	Acrolein 2,4-dinitrophenylhydrazone	> 97.9
<b>BCR-549</b>	Acetone 2,4-dinitrophenylhydrazone	> 99.6
<b>BCR-550</b>	Glutaraldehyde 2,4-dinitrophenylhydrazone	> 98.1

Availability: Approximately 10 mg of crystals in glass vials.

Compounds	<b>BCR-551</b> Acetonitrile solution Mass concentration (µg/mL)	<b>BCR-552</b> Acetonitrile solution (blank) (µg/mL)
Formaldehyde 2,4-Dinitrophenylhydrazone	2.94 ± 0.05	< 0.08
Acetaldehyde 2,4-dinitrophenylhydrazone	4.89 ± 0.07	< 0.05
Acrolein 2,4-dinitrophenylhydrazone	0.483 ± 0.011	< 0.04
Acetone 2,4-dinitrophenylhydrazone	4.96 ± 0.07	< 0.05

Availability: Set BCR-551-2 consists of 4 samples of BCR-551 and 1 sample of BCR-552.

	<b>BCR-553</b> Glass fibre filters Spiked mass per filter (expressed as µg formaldehyde)	<b>BCR-554</b> Glass fibre filters Mass per filter (blank) (expressed as µg formaldehyde)
Formaldehyde 2,4-dinitrophenylhydrazone on glass fibre filters	4.96 ± 0.06	< 0.1

Availability: Set BCR-553-4 consists of 2 samples of BCR-553 and 1 sample of BCR-554.

	Description	Latex spheres Parameters of the calibration line
<b>BCR-165</b>	Nominal 2 µm latex (0.02 % solids)	2.223 ± 0.013
<b>BCR-166</b>	Nominal 4.8 µm latex (0.2 % solids)	4.821 ± 0.019
<b>BCR-167</b>	Nominal 9.6 µm latex (1.4 % solids)	9.475 ± 0.018

Availability: Vials containing 2 mL of an aqueous suspension of latex spheres.

	Thyroxine (T <sub>4</sub> )	3,3',5-triiodothyronine (T <sub>3</sub> )
<b>IRMM-468</b>	98.6 ± 0.7	(0.51 ± 0.17)
<b>IRMM-469</b>	(1.50 ± 0.12)	97.1 ± 0.7

Values in brackets are not certified.

Availability: The material consists of an off-white crystalline powder in an amber glass vial sealed under N<sub>2</sub> atmosphere. Each vial contains about 100 mg of the powder.

## 3.2 MATRIX MATERIALS

### 3.2.1 CERTIFIED FOR THE HORMONE CONTENT

#### Cortisol reference panel of fresh frozen human sera ERM-DA451/IFCC

Serum No.	Certified value nmol/L	Uncertainty nmol/L	Serum No.	Certified value nmol/L	Uncertainty nmol/L
1	361	14	18	146	6
2	432	17	19	166	7
3	288	11	20	83	4
4	152	6	21	89	4
5	329	13	22	180	7
6	278	11	23	387	15
7	515	20	24	384	15
8	163	7	25	315	12
9	287	11	26	215	9
10	230	9	27	497	19
11	334	13	28	299	12
12	261	10	29	265	11
13	430	17	30	114	5
14	626	24	31	764	29
15	246	10	32	623	24
16	211	8	33	264	10
17	366	14	34	390	15

Availability: As panel of 34 x 1 mL serum in screw capped cryo-vials.

	Cortisol in human serum (concentration in the reconstituted material <sup>1)</sup> )					
	(µg/L)			(nmol/L)		
<b>ERM-DA192</b>	98.8	±	2.0	273	±	6
<b>ERM-DA193</b>	277	±	5	763	±	14

Availability: In units of lyophilised material of a 1.25 mL portion of serum kept under nitrogen in sealed glass ampoules.

<sup>1)</sup> The sample is to be reconstituted with (1.25 ± 0.01) mL of distilled water.

	Progesterone in human serum (concentration in the reconstituted material <sup>1)</sup> )					
	(µg/L)			(nmol/L)		
<b>BCR-348R</b>	8.5	±	0.4	26.9	±	1.2
<b>ERM-DA347</b>	3.19	±	0.07	10.13	±	0.21

Availability: In units of lyophilised material of a 1 mL portion of serum kept under nitrogen in sealed glass ampoules.

<sup>1)</sup> The sample is to be reconstituted with (1.0 ± 0.01) mL of distilled water.

	17β-Estradiol in human serum (concentration in the reconstituted material) Amount-of-substance concentration (nmol/L)					
	<b>BCR-576</b> <sup>1)</sup>	0.114	±	0.005		
<b>BCR-577</b> <sup>2)</sup>	0.689	±	0.032			
<b>BCR-578</b> <sup>2)</sup>	1.34	±	0.07			

Availability: BCR-576, -577, -578 are lyophilised material of a 5 mL (BCR-576) or 1 mL (BCR-577 and BCR-578) portion of serum kept under nitrogen in sealed glass ampoules.

<sup>1)</sup> The sample is to be reconstituted with (5.00 ± 0.05) mL of distilled water.

<sup>2)</sup> The sample is to be reconstituted with (1.00 ± 0.01) mL of distilled water.

### 3.2.2 CERTIFIED FOR THE TOTAL ELEMENT CONTENT AND OTHER PROPERTIES

	Description	Substance	Metal concentrations in the reconstituted material <sup>1)</sup> (µg/L)
<b>ERM-CE195</b>	Lyophilised bovine blood	Pb	416 ± 9
		Cd <sup>2)</sup>	5.06 ± 0.15
<b>ERM-CE196</b>	Lyophilised bovine blood	Pb	772 ± 11
		Cd <sup>2)</sup>	12.33 ± 0.20
<b>BCR-634</b>	Lyophilised human blood	Pb	46 ± 5
		Cd	1.4 ± 0.4
<b>BCR-635</b>	Lyophilised human blood	Pb	210 ± 24
		Cd	6.6 ± 0.6
<b>BCR-636</b>	Lyophilised human blood	Pb	0.52 · 10 <sup>3</sup> ± 0.05 · 10 <sup>3</sup>
		Cd	11.6 ± 0.6

Availability: In units of lyophilised material equivalent to about 5.75 mL of bovine blood with additives kept under nitrogen in rubber stoppered vials.

BCR-634, BCR-635 and BCR-636 are available in lyophilised form in brown glass vials, containing approximately 0.6 g dry matter equivalent to 3.0 mL of fresh whole blood.

<sup>1)</sup> The sample is to be reconstituted with (5.00 ± 0.01) mL water.

<sup>2)</sup> Recertified by the JRC.

	Description	Substance	Element concentration in the reconstituted material <sup>1)</sup> (mmol/L)
<b>BCR-304</b>	Lyophilised human serum	Ca	2.201 ± 0.019
		Li	0.985 ± 0.029
		Mg	1.85 ± 0.03

Availability: In units of lyophilised material equivalent to about 5.3 mL of human serum kept under vacuum in rubber stoppered vials.

<sup>1)</sup> The sample is to be reconstituted with (5.00 ± 0.01) mL bi-distilled water.

	Description	Substance	Metal concentrations (µg/L)
<b>BCR-637</b>	Human serum	Al	12.5 ± 3.0
		Se	81 ± 7
		Zn	1110 ± 220
<b>BCR-638</b>	Human serum	Al	55 ± 7
		Se	104 ± 7
		Zn	1430 ± 210
<b>BCR-639</b>	Human serum	Al	194 ± 14
		Se	133 ± 12
		Zn	2360 ± 140

Availability: supplied in frozen form in white plastic vials containing approximately 4.5 mL serum.

Substance	<b>ERM-DB001</b> Human hair (mg/kg)		
As	0.044	±	0.006
Cd	0.125	±	0.007
Cu	33	±	4
Hg	0.365	±	0.028
Pb	2.14	±	0.20
Se	3.24	±	0.24
Zn	209	±	12

Availability: supplied in amber glass bottle, provided in aluminium sachet, and contains a minimum amount of 3.5 g of a human hair homogeneous powder

### 3.2.3 CERTIFIED FOR PROTEIN CONTENT

	Description	Mass concentration in the reconstituted material <sup>1)</sup> (g/L)
<b>BCR-393</b>	Lyophilised Apo A I from human serum	1.06 ± 0.05

Availability: In units of lyophilised material equivalent to about 1.5 mL of Apolipoprotein solution in sealed glass ampoules under nitrogen.

<sup>1)</sup> The sample must be reconstituted with 1.0 mL of phosphate buffer.

	Description	Protein mass per ampoule <sup>1)</sup> (µg)
<b>BCR-486</b>	Purified alphafoetoprotein (AFP)	100 ± 9

Availability: BCR-486 is provided in sealed glass ampoules. Each sample is in lyophilised form and it contains purified AFP without additives.

The protein mass per ampoule is equivalent to (100 ± 9) µg when the material is reconstituted with 1.0 mL phosphate buffer according to the specified procedure.

<sup>1)</sup> Carbohydrate mass of the molecule is not included.

	Description	Protein mass/ampoule
<b>BCR-613</b>	Prostate specific antigen in the reconstituted material	71 ± 7 µg

Availability: Lyophilised PSA in sealed glass ampoules kept under argon gas.

<b>ERM-DA470k</b> Human Serum Proteins			
Description	Mass concentration <sup>1)</sup> (g/L)	Description	Mass concentration <sup>1)</sup> (g/L)
α <sub>2</sub> macroglobulin (A2M)	1.43 ± 0.06	Haptoglobin (HPT)	0.889 ± 0.021
α <sub>1</sub> acid glycoprotein (AAG)	0.617 ± 0.013	Immunoglobulin A (IgA)	1.80 ± 0.05
α <sub>1</sub> antitrypsin (AAT)	1.12 ± 0.03	Immunoglobulin G (IgG)	9.17 ± 0.18
Albumin (ALB)	37.2 ± 1.2	Immunoglobulin M (IgM)	0.723 ± 0.027
β-2-microglobulin (B2M)	0.00217 ± 0.00007	Transferrin (TRF)	2.36 ± 0.08
Complement 3c (C3c)	1.00 ± 0.04	Transthyretin (TTR)	0.220 ± 0.018
Complement 4 (C4)	0.162 ± 0.007		

Availability: Glass bottle containing lyophilised materials equivalent to about 1 mL of serum with additives kept under nitrogen.

<sup>1)</sup> Sample to be reconstituted with (1.00 ± 0.01) g water.

	Description	Mass concentration (mg/L)
<b>ERM-DA471/IFCC</b>	Cystatin C	5.48 ± 0.15

Availability: Glass vial containing lyophilised human serum spiked with cystatin C.

	Description	Mass concentration (mg/L)
<b>ERM-DA474/IFCC</b>	C-reactive protein (CRP)	41.2 ± 2.5

Availability: Glass ampoule containing at least 1 mL processed human serum spiked with CRP.



	Description	Mass concentration (mg/L)	
<b>ERM-DA476/IFCC</b>	anti-MPO IgG	84	± 9
<b>ERM-DA483/IFCC</b>	IgG PR3 ANCA	270	± 29

Availability: Glass vial containing lyophilised material equivalent to 1 mL of serum with additives kept under nitrogen.

	Description	Mass concentration (µg/L)	
<b>ERM-DA480/IFCC</b>	Abeta 42 in cerebrospinal fluid (CSF) (low level)	0.45	± 0.07
<b>ERM-DA481/IFCC</b>	Abeta 42 in cerebrospinal fluid (CSF) (medium level)	0.72	± 0.11
<b>ERM-DA482/IFCC</b>	Abeta 42 in cerebrospinal fluid (CSF) (high level)	1.22	± 0.18

Availability: Microvial containing at least 0.5 mL frozen liquid.

	Description	Absorbance at 540 nm and 10.00 mm pathlength	Mass concentration (mg/L)	Substance concentration (µmol/L)
<b>BCR-522</b>	Haemiglobincyanide (HiCN) in bovine blood lysate	0.5457 ± 0.0009	800.3 ± 1.3	49.61 ± 0.08

Availability: Bovine blood lysate in sealed brown glass ampoules (10 mL) equivalent to about 800.3 mg/L of haemiglobincyanide.

	Description	Amount-of-substance concentration of creatinine (µmol/L)	
<b>BCR-573</b>	Creatinine in human serum	68.7	± 1.4
<b>BCR-574</b>	Creatinine in human serum	105.0	± 1.3
<b>BCR-575</b>	Creatinine in human serum	404.1	± 7.1

Availability: BCR-573, -574, -575 are the lyophilised form of approximately 1 mL portion of serum, with no additives. The mass of the lyophilised material contained in the ampoule is about 0.09 g.

### BCR-573i (RM) Set of creatinine interfering substances

Availability: Consists of three vials with lyophilised solutions

- 0.025 mg calcium dobesilate / 1.2 mg cefoxitin;
- 0.044 mg sodium pyruvate;
- 0.108 mg bilirubin ditaurate.

	Description	Amount-of-substance fraction (mmol/mol)	
<b>IRMM/IFCC-467</b>	Haemoglobin isolated from whole blood	HbA0/(HbA1c + HbA0)	> 976

Availability: Provided in vials containing approximately 39 mg of a deep frozen buffered solution.

	Description	Amount-of-substance fraction (mmol/mol)		
<b>ERM-AD500/IFCC</b>	Haemoglobin in buffer	HbA1c/(HbA1c + HbA0)		
		blank	0.0	± -0.0; +0.4
		Level 1	28.6	± 0.9
		Level 2	57.8	± 1.3
		Level 3	86.7	± 2.2
		Level 4	118.8	± 2.6
		Level 5	153	± 5

Availability: Provided in vials containing about 1mg of a deep frozen buffered solution.

### 3.2.4 CERTIFIED FOR CATALYTIC ACTIVITY

	Description	Catalytic concentration in reconstituted material Certified value	
		U/L	μkat/L
<b>BCR-647</b>	Human adenosine deaminase (ADA1), from human erythrocytes <sup>2)</sup>		2.55 ± 0.09
<b>BCR-693</b>	Human pancreatic lipase from pancreatic juice <sup>4)</sup>		28.9 ± 1.2
<b>BCR-694</b>	Human pancreatic lipase (recombinant) <sup>4)</sup>		17.4 ± 1.0
<b>ERM-AD452/IFCC</b>	γ-Glutamyltransferase partially purified, from pig kidney <sup>3)</sup>	114.1 ± 2.4	1.90 ± 0.04
<b>ERM-AD453k/IFCC</b>	Human lactate dehydrogenase isoenzyme 1 (LD1) <sup>3)</sup>	330 ± 7	5.50 ± 0.12
<b>ERM-AD454k/IFCC</b>	Alanine aminotransferase (ALT) <sup>3)</sup>	103.8 ± 2.6	1.73 ± 0.05
<b>ERM-AD455k/IFCC</b>	Creatine kinase isoenzyme MM (CK-MM) <sup>3)</sup>	314 ± 6	5.23 ± 0.10
<b>ERM-AD456/IFCC</b>	Pancreatic α-amylase <sup>3)</sup>	274 ± 7	4.58 ± 0.12
<b>ERM-AD457/IFCC</b>	Aspartate Transaminase (AST)	104.6 ± 2.7	1.74 ± 0.05

Availability: Sealed glass ampoules of lyophilised material equivalent to about 1 mL of a solution of enzyme stabilized by incorporation in serum albumin matrix of bovine (ERM-AD452/IFCC and ERM-AD457/IFCC) origin kept under dry nitrogen. BCR-647 has been stabilised by incorporation in a matrix of 50 mmol/L Tris/HCl buffer 9pH=7.4) and human serum albumin (30 g/L). ERM-AD456/IFCC is available in glass vials containing lyophilised powder from 1.0 mL of the alpha-amylase solution. ERM-AD453k/IFCC, ERM-AD454k/IFCC and ERM-AD455k are available in glass vials containing lyophilised powder from 1 mL of buffer solution.

BCR-693 and BCR-694 are provided in ampoules of lyophilised material equivalent to about 1 mL of stabilised enzyme.

- <sup>1)</sup> According to IFCC recommended method at 30 °C.  
<sup>2)</sup> According to method specified in report.  
<sup>3)</sup> According to IFCC recommended method at 37 °C.  
<sup>4)</sup> According to method described in certification report at 37 °C.

### 3.2.5 CERTIFIED FOR DNA SEQUENCE AND MASS CONCENTRATION

#### CRMs for monitoring leukaemia (ERM-AD623)

SET OF PLASMID SOLUTIONS		
	Number of specific DNA fragments per plasmid	
	Certified value	Uncertainty
<i>BCR-ABL</i> b3a2 transcript	1	negligible
<i>BCR</i> transcript	1	negligible
<i>GUSB</i> transcript	1	negligible
	Copy number concentration of the plasmid	
	Certified value [cp/μL]	Uncertainty [cp/μL]
<b>ERM-AD623a</b>	1.08×10 <sup>6</sup>	0.13×10 <sup>6</sup>
<b>ERM-AD623b</b>	1.08×10 <sup>5</sup>	0.11×10 <sup>5</sup>
<b>ERM-AD623c</b>	1.03×10 <sup>4</sup>	0.10×10 <sup>4</sup>
<b>ERM-AD623d</b>	1.02×10 <sup>3</sup>	0.09×10 <sup>3</sup>
<b>ERM-AD623e</b>	1.04×10 <sup>2</sup>	0.10×10 <sup>2</sup>
<b>ERM-AD623f</b>	10.0	1.5

Availability: ERM-AD623 is a set of six plasmid solutions (a-f). Each of six vials contains approximately 600 μL of plasmid solution.

## CRMS for quantifying mass concentration of Lambda DNA

ERM-AD442K Lambda DNA in a solution		
	DNA mass concentration	
	Certified value [ng/μL]	Uncertainty [ng/μL]
Lambda DNA	57.5	1.1
	Copy number concentration	
	Indicative value [cp/μL]	Uncertainty [cp/μL]
Lambda DNA	(1.20 x 10 <sup>9</sup> )	(0.17 x 10 <sup>9</sup> )

Values in brackets are not certified.

### 3.2.6 OTHERS

	Description	Parameters of the calibration line		
<b>ERM-AD149</b>	Lyophilised rabbit thromboplastin	Slope	1.257 ± 0.013	
		Intercept	-0.242 ± 0.019	

Availability: ERM-AD149 in sealed glass ampoules containing the lyophilised form of a 0.5 mL aliquot of the extract of rabbit brain tissue, without calcium ion added.

	<b>BCR-665</b> Asbestos fibres in lung tissue (Number of fibres of more than 1 μm in length in million per g dry tissue)	<b>BCR-666</b> Asbestos fibres in lung tissue (Number of fibres of more than 1 μm in length in million per g dry tissue)
Amosite + crocidolite	49 ± 16	2.3 ± 0.9
Anthophyllite	1.8 ± 0.9	5.1 ± 1.5

Availability: Sealed vials with 100 mg of lung tissue.

	<b>IRMM-435</b> Pharmaceutical glass containers Alkali leaching and release
Volume of titration solution 0.01 mol/L HCl per 50 mL of leachate	0.38 ± 0.04 mL
Sodium release per volume of leachate	1.41 ± 0.14 mg/L
Release of Na <sub>2</sub> O per volume of leachate	1.91 ± 0.19 mg/L

Availability: Each unit of IRMM-435 consists of 20 vials of 18.9 mL brimful capacity, made of a semi-durable type of glass, which screw caps.

## 4 MATERIALS CERTIFIED FOR PHYSICAL PROPERTIES

### 4.1 CERTIFIED FOR THERMAL PROPERTIES

#### Resin bonded glass fibre board IRMM-440

The certified thermal conductivity between – 10 °C and + 50 °C is given by

$$\lambda [W/(m.K)] = 2.93949 \cdot 10^{-2} + \frac{T}{^{\circ}C} \cdot 1.060 \cdot 10^{-4} + \frac{T^2}{(^{\circ}C)^2} \cdot 2.047 \cdot 10^{-7}$$

The uncertainty of the certified thermal conductivity is  $\pm 0.00028$  W/(m.K) at the 95 % confidence level over the range [- 10 °C / + 50 °C].

An indicative value for the thermal conductivity between -170°C and -10°C is given by

$$\lambda [W/(m.K)] = 2.95 \cdot 10^{-2} + \frac{T}{^{\circ}C} \cdot 1.08 \cdot 10^{-4} + \frac{T^2}{(^{\circ}C)^2} \cdot 2 \cdot 10^{-8}$$

The indicative uncertainty of thermal conductivity is  $\pm 5\%$  at the 95 % confidence level over the range [- 170 °C / - 10 °C].

These equations are valid for a sample of the reference material within the density range [64 kg/m<sup>3</sup> – 78 kg/m<sup>3</sup>].

IRMM-440 is available in the following dimensions: (300 x 300 x 35) mm, (500 x 500 x 35) mm, (600 x 600 x 35) mm, (1000 x 1000 x 35) mm.

#### Glass-ceramic BCR-724

The certified thermal diffusivity between 298 K and 1025 K is given by

$$\alpha [m^2/s \cdot 10^{-6}] = 4.406 - 1.351 \cdot 10^{-2} \cdot T + 2.133 \cdot 10^{-5} \cdot T^2 - 1.541 \cdot 10^{-8} \cdot T^3 + 4.147 \cdot 10^{-12} \cdot T^4$$

The uncertainty of the certified thermal diffusivity is  $\pm 6.1$  [%] at the 95 % confidence level over the range from 298 K to 1025 K.

The certified thermal conductivity between 298 K and 1025 K is given by

$$\lambda [W/(m \cdot K)] = 2.332 + 515.1 / T$$

The uncertainty of the certified thermal conductivity is  $\pm 6.5$  [%] at the 95 % confidence level over the range from 298 K to 1025 K.

Availability: Glass-ceramic cylinders in different shapes (BCR-724A: diameter = 13.0 mm, height > 18 mm; BCR-724B: diameter = 13.9 mm, height > 21 mm; BCR-724D: diameter = 26.9 mm, height > 22 mm).

	Description	Cold filter plugging point CFPP Temperature (°C)		Cloud point CP (°C)	
<b>ERM-FC395k</b>	Gasoil	- 7.9	± 1.6	- 7.2	± 3.0
<b>ERM-EF002</b>	Biodiesel (B100 Rapeseed)	- 15.2	± 1.3	- 4.5	± 1.0
<b>ERM-EF004</b>	Diesel (B7)	- 27.9	± 2.7	- 6.8	± 0.4

Values in brackets are not certified.

Availability: ERM-FC395k consists of a set two amber glass ampoules, each containing 27 mL of gas oil.  
ERM-EF002 consists of a set two amber glass ampoules, each containing 27 mL of biodiesel  
ERM-EF004 consists of a set two amber glass ampoules, each containing 27 mL of diesel (B7)

Substance	ERM-EF411 Hard coal			ERM-EF412 Brown coal			ERM-EF413 Furnace coke		
Gross calorific value (GCV) (MJ/kg)	29.0	±	0.4	26.02	±	0.22	29.5	±	0.4
Net calorific value (NCV) (MJ/kg)	28.0	±	0.4	24.98	±	0.25	29.4	±	0.5
Volatile matter (g/100 g)	38.1	±	1.0	50.1	±	0.7			
Ash (g/100 g)	8.3	±	0.7	4.11	±	0.23			
C (g/100 g)	71.4	±	1.0	66.2	±	0.7	87.8	±	1.9
Ca (g/kg)				9.8	±	0.4	2.92	±	0.22
Cd (mg/kg)				(0.012	±	0.004)			
Cl (mg/kg)	99	±	19				(350	±	130)
Co (mg/kg)	(3.5	±	0.8)						
Cu (mg/kg)				(0.68	±	0.22)			
H (g/100 g)	4.80	±	0.14	4.88	±	0.15			
Hg (mg/kg)	(0.079	±	0.015)	0.071	±	0.011			
K (mg/kg)				229	±	18			
Mg (g/kg)				(3.73	±	0.16)	(0.00123	±	0.00019)
Mn (mg/kg)				48.6	±	1.9			
N (g/100 g)	1.43	±	0.10	0.74	±	0.06	1.10	±	0.07
Na (g/kg)				2.20	±	0.12	0.64	±	0.07
Pb (mg/kg)				(0.25	±	0.05)	(8.41	±	1.6)
S (g/100 g)	0.598	±	0.017	0.360	±	0.023	0.58	±	0.12
Sb (mg/kg)	(1.5	±	0.4)	(0.024	±	0.004)			
Se (mg/kg)	5.1	±	1.0	0.96	±	0.14	1.33	±	0.26
Tl (mg/kg)	(0.24	±	0.07)						
V (mg/kg)	(22	±	7)	0.57	±	0.04			
Zn (mg/kg)	(13	±	4)	(0.99	±	0.18)	16.0	±	2.5

Values in brackets are not certified.

Availability: ERM-EF411, ERM-EF412 and ERM-EF413 are available in units of about 50 g in aluminium-laminated sachets.

## 4.2 CERTIFIED FOR MECHANICAL PROPERTIES

### Shear testing of powders BCR-116

The flow of powders or granulated materials under the force of gravity affects the design and operation of silos used for their bulk storage. The European Federation of Chemical Engineering (EFCE) therefore developed a test method, based on the Jenike Shear Cell, to determine the shear strength of powders under different compaction and loading conditions. The complexity of this method is such that errors due to poor technique can easily arise. A reference material has therefore been produced with which laboratories can verify both their equipment and experimental technique.

Essentially the EFCE method consists of using a known load to compact a powder sample into a cylindrical Jenike Cell composed of two metal rings one upon the other. Having reached critical compaction of the powder, the steady state force necessary to displace the upper ring horizontally with respect to the lower one is determined with the compaction load still applied. Having established steady state shear the normal load on the powder is then reduced and the horizontal force necessary to continue to shear the powder is determined. It is this variation of the shear force as a function of the reduced normal load for a given compaction load which characterizes the powder.

The reference material consists of 3 kg of limestone powder packed in a polyethylene jar. It is accompanied by a certificate giving shear stress as a function of normal applied stress for four different powder compaction stresses.

## Creep BCR-425

Creep is the progressive deformation of a material under load. Metallic materials are usually tested at elevated temperatures for periods of 1 000 to 100 000 hours by surrounding them with a suitable constant temperature furnace. The need to operate under such conditions gives rise to problems of alignment, strain measurement, temperature measurement etc. which can result in considerable differences in results between laboratories.

BCR-425 was therefore developed to allow laboratories to validate their creep testing rigs and procedures as a whole within a reasonable time (500 to 600 hours) using a material whose properties are sensitive to test conditions.

The test piece is delivered in the form of a bar of 14 mm diameter and 500 mm length which must be machined by the laboratory to the required shape and size.

At a test temperature of 600 °C, using an applied stress of 160 Mpa the certified properties are as follows:

Creep rate at 400 hours of	(72 ± 5) 10 <sup>-6</sup> h <sup>-1</sup>
Time to a creep strain of 2 %	(278 ± 16) h
Time to a creep strain of 4 %	(557 ± 30) h

## Nimonic 75 for ambient temperature tensile properties BCR-661

Property	Certified value
0.2 % proof stress R <sub>p0.2</sub>	(300 ± 8) Mpa
0.5 % proof stress R <sub>p0.5</sub>	(318 ± 7) Mpa
Ultimate tensile strength R <sub>m</sub>	(750 ± 14) Mpa
Elongation to fracture A	(40.9 ± 0.9) %
Reduction in area Z	(60 ± 4) %

Availability: BCR-661B is supplied as 1 bar of 500 mm long, sufficient for the manufacture of three test-pieces of about 150 mm long.

## Scratch testing BCR-692

Failure event	Critical load	
	Certified value (N)	Uncertainty (N)
Forward chevron cracks at the borders of the scratch track. <i>(Lc<sub>1</sub> shall be taken at the closest end of the event to the scratch track start).</i>	(Lc <sub>1</sub> ) 13.6	1.8
Forward chevron cracks at the borders of the scratch track, with <i>local</i> interfacial spallation or with <i>gross</i> interfacial spallation. <i>(Lc<sub>2</sub> shall be taken at the failure event that occurs first and at the closest end of the event to the scratch track start).</i>	(Lc <sub>2</sub> ) 17.0	2.1
Gross interfacial shell-shaped spallation. <i>(Lc<sub>3</sub> shall be taken at the first point where the substrate can be seen at the <u>centre</u> of the track in a crescent that goes completely through the track).</i>	(Lc <sub>3</sub> ) 28	2.9

Availability: The reference samples are (30x30x5) mm steel coupons coated with a diamond-like carbon coating (DLC) applied by plasma-assisted chemical vapour deposition. The coupons are distributed in a reusable plastic box containing desiccant.

## Impact toughness Charpy specimens

Impact toughness is the ability of a material to resist fracture under the effect of shock loading. It is determined by means of a conventional test defined in ISO and CEN Standards.

The test is sensitive to many sources of errors and therefore already 40 years ago, ASTM specification required testing machines to be verified periodically by reference specimens. The recent CEN standard (EN 10045-2: 1993) specifies that impact toughness machines should be certified by using the BCR certified reference Charpy specimens or other specimens traceable to the latter.

The reference specimens described here are supplied by groups of five. Their use must be done in accordance with the instructions given in the certification report, in particular with regard to degreasing. The fracture energy is certified for the CEN striker (knife of 2 mm radius).

Measurements generally need to be performed at 20°C, with the exception of ERM-FA013 where one batch has certified values at 0°C and 20°C to avoid jamming. We will deliver by default a batch certified by 20°C unless the order explicitly mentions the value at 0°C.

For each energy level there are several batches of slightly different values. The following table gives the nominal values, the certificate gives the actual values.

ERM-FA013 – Low Energy 20°C	20-30 J
ERM-FA013 – Low Energy 0°C	20-30 J
ERM-FA015	80 J
ERM-FA016	120 J
ERM-FA415	150J

## 4.3 CERTIFIED FOR MORPHOLOGICAL PROPERTIES

Particle size distributions				
	Form of Quartz	Certified Property	Size Range (µm)	Unit Size (g)
<b>BCR-066</b>	Powder	Stokes' diameter	0.35 - 3.50	10
<b>BCR-067</b>	Powder	Stokes' diameter	2.40 - 32.00	10
<b>BCR-068</b>	Sand	Volume diameter	160.0 - 630.0	100
<b>BCR-069</b>	Powder	Stokes' diameter	14.0 - 90.0	10
<b>BCR-070</b>	Powder	Stokes' diameter	1.20 - 20.00	10

Particle size distributions				
	Form of Quartz	Certified Property	Size Range (µm)	Unit Size (g)
<b>BCR-130</b>	Powder	Volume diameter	50 - 220	50
<b>BCR-131</b>	Powder	Volume diameter	480 - 1800	200
<b>BCR-132</b>	Gravel	Volume diameter	1400 - 5000	700

Particle size distributions			
Corundum	Certified Property	Size Range (µm)	Unit Size (g)
<b>ERM-FD066</b>	Volume-weighted equivalent diameter by laser diffraction, Mie theory, wet dispersion	1.44 - 7.45	20
	Number-weighted equivalent diameter by scanning electron microscopy (SEM)	1.07 - 5.1	
<b>ERM-FD069</b>	Volume-weighted equivalent diameter by laser diffraction, Fraunhofer approximation	13.9 - 79.8	40
	Volume-weighted equivalent diameter by laser diffraction, Mie theory	15.0 - 82	
	Number-weighted area-equivalent diameter by optical microscopy	12.4 - 46	

	Description	Specific Surface Area (m <sup>2</sup> · g <sup>-1</sup> )	Unit Size (g)
<b>BCR-169</b>	Alpha alumina	0.104 ± 0.012	60
<b>BCR-170</b>	Alpha alumina	1.05 ± 0.05	60
<b>BCR-171</b>	Alumina	2.95 ± 0.13	50
<b>BCR-172</b>	Quartz	2.56 ± 0.10	10
<b>BCR-173</b>	Titanium dioxide	8.23 ± 0.21	46
<b>BCR-175</b>	Tungsten	0.18 ± 0.04	200

### Mullite (3Al<sub>2</sub>O<sub>3</sub> · 2SiO<sub>2</sub>) BCR-301 (RM)

High crystallinity.

Vitreous phase 0.03 g/g. No other phase detected.

Impurities in g/kg:

Fe <sub>2</sub> O <sub>3</sub>	< 2	Na <sub>2</sub> O	< 1
CaO	< 1.2	K <sub>2</sub> O	< 0.5
MgO	< 0.5	TiO <sub>2</sub>	< 0.5

Mullite <b>BCR-301 (RM)</b>		
Reflection	Lattice spacing (nm)	Relative intensity
[110]	0.538 2	0.50
[210]	0.339 0	1
[220]	0.269 5	0.40
[121]	0.220 6	0.59
[331]	0.152 4	0.36

	Description	Micropore volume (cm <sup>3</sup> / g <sup>1</sup> )	Median micropore width (nm)
<b>BCR-704</b>	Faujasite type zeolite	0.205 ± 0.006	0.668 ± 0.019
<b>BCR-705</b>	Linde type A zeolite	0.181 ± 0.006	0.592 ± 0.020

Availability: Glass bottle containing 10 g of pellets.

### Reference material for depth profiling by ion beam sputtering BCR-261T

In order to achieve the accuracy required when measuring compositional depth profiles using ion beam sputtering in association with Auger Electron Spectroscopy, a reference material of accurately known thickness on a stable substrate is required. BCR-261T is a tantalum pentoxide on tantalum foil reference material existing in two nominal thicknesses of 30 and 100 nm.

	Nominal thickness (nm)	Certified values	
		10 <sup>21</sup> oxygen atoms/m <sup>2</sup>	oxide thickness ratio
<b>BCR-261T</b>	(30)	1.72 ± 0.07	0.321 ± 0.013
	(100)	5.40 ± 0.12	

Values in brackets are not certified.

Availability: Four rectangular foils of 5 x 10 mm of each oxide thickness.

<b>Colloidal Silica in water ERM-FD100</b>	Equivalent spherical diameter	
	Certified value (nm)	Uncertainty (nm)
Intensity-weighted harmonic mean diameter (DLS)	19.0	0.6
Intensity-based modal Stokes diameter (CLS)	20.1	1.3
Number-based modal diameter (TEM/SEM)	19.4	1.3
Intensity-weighted mean diameter (SAXS)	21.8	0.7
Equivalent spherical diameter, volume-weighted mean (SAXS)	(20.4)	(1.6)
Zeta Potential	(- 43.0 mV)	(22 mV)

Values in brackets are not certified.

Availability: ERM-FD100 is available in 10 mL pre-scored amber glass ampoules containing approximately 9 mL of suspension.



Colloidal Silica in aqueous solution ERM-FD304	Equivalent spherical diameter	
	Certified value (nm)	Uncertainty (nm)
Scattering intensity-weighted harmonic mean diameter (DLS)	42.1	0.6
Extinction intensity-based modal Stokes (CLS)	33.0	3.0
Number-based modal diameter (TEM/SEM)	(27.8)	(1.5)

Values in brackets are not certified.

Availability: ERM-FD304 is available in 10 mL pre-scored amber glass ampoules containing approximately 9 mL of suspension.

Mixture of Silica Nanoparticles in aqueous solution: ERM-FD102	Equivalent diameter			
	Size class A		Size class B	
	Certified value (nm)	Uncertainty (nm)	Certified value (nm)	Uncertainty (nm)
Scattering intensity-weighted arithmetic mean hydrometric diameter (DLS)	17.8	1.5	88.5	2.2
Extinction intensity-weighted modal Stokes' diameter (CLS)	23.9	2.0	88	7
Number-weighted modal area-equivalent diameter (TEM and SEM)	18.2	1.6	84.0	2.1
Number-weighted median area-equivalent diameter (TEM and SEM)	18.3	1.7	83.3	2.3
Number-weighted mean hydrodynamic diameter (PTA)	-	-	(82)	(4)
Number-weighted modal maximum particle height (ATM)	(16.9)	(1.8)	(80)	(6)

Values in brackets are not certified. More indicative & information values are given on the certificate

Availability: ERM-FD102 is available in 10 mL pre-scored amber glass ampoules containing approximately 9 mL of suspension.

Mixture of Silica Nanoparticles in aqueous solution: ERM-FD101b	Size distribution parameter: Weighting / Averaging	Certified value [nm]	Uncertainty [nm]
Hydrodynamic diameter from DLS (cumulants method)	Scattered light intensity-weighted / harmonic mean	89.5	2.3
Hydrodynamic diameter from DLS (distribution calculation algorithms)	Scattered light intensity-weighted / mean (arithmetic, harmonic, geometric) and modal	93	4
	Number-weighted / modal	82	4
Hydrodynamic diameter from PTA	Number-weighted / arithmetic mean	87	4
	Number-weighted / median	82	4
	Light extinction-weighted / modal	87	8
Stokes diameter from CLS <sup>1</sup> (turbidimetry)	Light extinction-weighted / modal	87	8
	Number-weighted / modal	83.7	2.2
Area-equivalent diameter from EM	Number-weighted / modal	83.7	2.2
	Number-weighted / median	83.5	2.2
Mean particle diameter from SAXS (model fitting)	Scattered X-ray intensity-weighted / modal	82.5	1.8
	Volume-weighted / modal	81.7	1.8
	Number-weighted / modal	80.9	1.7
Mean particle diameter from SAXS (Guinier approximation)	(Volume)-weighted / mean	(87)	(6)

Values in brackets are not certified. More material information is given on the certificate

Availability: ERM-FD101b is available in 10 mL pre-scored amber glass ampoules containing approximately 9 mL of suspension.

**ERM-FD103: TITANIUM DIOXIDE NANORODS  
IN 1- BUTANOL**

Size parameter	Weighting / Averaging	Certified value [nm]	Uncertainty [nm]
Minimum Feret diameter (F <sub>min</sub> )	Number-weighted / mode	16.0	0.9
	Number-weighted / Median	16.1	0.9
Maximum Feret diameter (F <sub>max</sub> )	Number-weighted / mode	53.5	2.6
	Number-weighted / Median	54.0	2.4
Maximum inscribed circle diameter	Number-weighted / mode	15.1	0.7
	Number-weighted / Median	15.1	0.7
Area-equivalent diameter (ECD)	Number-weighted / mode	29.8	1.2
	Number-weighted / Median	29.9	1.3
Shape parameter	Weighting / Averaging	Certified value	Uncertainty
Aspect ratio 1) (F <sub>min</sub> /F <sub>max</sub> )	Number-weighted / mode	0.298	0.018
	Number-weighted / Median	0.296	0.013

Values in brackets are not certified. More material information is given on the certificate

Availability: ERM-FD103 is available in 5 mL pre-scored amber glass ampoules containing approximately 2 mL of suspension.

## 5 MATERIALS RELATED TO INDUSTRIAL APPLICATIONS

### 5.1 CERTIFIED FOR COMPOSITION

Certified Parameter	IRMM-441 n-Heptane (g/kg)	IRMM-442 Isooctane (g/kg)
Isooctane, purity by difference		999.85 ± 0.05
n-Heptane, purity by difference	999.85 ± 0.05	
<u>Impurities</u>		
Total organics (other than isooctane)		0.11 ± 0.04
Total organics (other than n-Heptane)	0.12 ± 0.05	
Isooctane	0.07 ± 0.02	
n-Heptane		0.02 ± 0.02
Water	0.03 ± 0.02	0.04 ± 0.02

Availability: IRMM-441 and -442 are supplied in ampoules of 100 mL.

ERM-EF001 – Biodiesel certified for selected parameters specified in EN 14214	Unit	Certified values
Ester content	% (m/m)	98.9 ± 1.7
Linolenic acid methyl ester content	% (m/m)	8.82 ± 0.16
Triglyceride content	% (m/m)	<0.1
Density (at 15 °C)	kg/m <sup>3</sup>	883.20 ± 0.04
Viscosity (at 40 °C)	mm <sup>2</sup> /s	4.465 ± 0.005
Oxidation stability (at 110 °C)	h	9.8 ± 0.5
Iodine value	g iodine/100 g	112 ± 4
Flash point	°C	181 ± 14

Availability: Vials containing about 27 mL of biodiesel.

ERM-EF003 - Diesel (B7) certified for selected parameters specified in EN 590	Unit	Certified values
Fatty acid methyl ester content	% (V/V)	6.88 ± 0.17
Mono-aromatic hydrocarbon content	% (m/m)	18.8 ± 0.7
Di-aromatic hydrocarbon content	% (m/m)	1.84 ± 0.19
Polycyclic aromatic hydrocarbon content	% (m/m)	2.01 ± 0.25
Total aromatic hydrocarbon content	% (m/m)	20.8 ± 0.9
Density (at 15.0 °C)	kg/m <sup>3</sup>	837.23 ± 0.07
Kinematic viscosity (at 40.0 °C)	mm <sup>2</sup> /s	2.892 ± 0.012
Lubricity	µm	220 ± 60

Availability: Vials containing about 27 mL of diesel (B7)

	Description	Cold filter plugging point CFPP Temperature (°C)	Cloud point CP (°C)
ERM-EF002	Biodiesel (B100 Rapeseed)	- 15.2 ± 1.3	- 4.5 ± 1.0
ERM-EF004	Diesel (B7)	- 27.9 ± 2.7	- 6.8 ± 0.4

Availability: ERM-EF002 consists of a set of two amber glass ampoules, each containing 27 mL of biodiesel.

ERM-EF004 consists of a set of two amber glass ampoules, each containing 27 mL of diesel (B7).

	Description	Substance	Certified values			
<b>BCR-032</b>	Moroccan Phosphate rock	CaO	518	±	4	g/kg
		P <sub>2</sub> O <sub>5</sub>	329.8	±	1.7	g/kg
		CO <sub>2</sub>	51.0	±	0.8	g/kg
		F	40.4	±	0.6	g/kg
		SiO <sub>2</sub>	20.9	±	1.2	g/kg
		SO <sub>3</sub>	18.4	±	0.8	g/kg
		Al <sub>2</sub> O <sub>3</sub>	5.5	±	0.6	g/kg
		MgO	4.0	±	0.1	g/kg
		Fe <sub>2</sub> O <sub>3</sub>	2.3	±	0.1	g/kg
		As	(9.5	±	0.5	mg/kg)
		B	(22.6	±	2.2	mg/kg)
		Cd	(20.8	±	0.7	mg/kg)
		Cr	(257	±	16	mg/kg)
		Co	(0.59	±	0.06	mg/kg)
		Cu	(33.7	±	1.4	mg/kg)
		Hg	(0.055	±	0.011	mg/kg)
		Mn	(18.8	±	1.3	mg/kg)
		Ni	(34.6	±	1.9	mg/kg)
		Ti	(171	±	10	mg/kg)
V	(153	±	7	mg/kg)		
Zn	(253	±	6	mg/kg)		

Values in brackets are not certified.

Availability: Units of about 100 g in the form of fine powder.

	Description	Substance	Certified values (g/kg)	
<b>BCR-010</b>	Tin ore	Sn	765.9	± 1.2

Availability: This CRM is contained in brown glass bottles. The approximate quantity per unit is 225 g.

	Description	Substance	Certified values (g/kg)	
<b>BCR-113</b>	Potassium Chloride	K	502.5	± 1.1
		Cl	478.0	± 0.9
		Na	15.3	± 0.2
		Ca	1.03	± 0.04
		Mg	0.24	± 0.01
		water soluble K	501.3	± 0.7
<b>BCR-114</b>	Potassium Sulphate	K	418.0	± 0.9
		SO <sub>4</sub>	533	± 2
		Cl	18.5	± 0.1
		Na	11.0	± 0.1
		Ca	9.4	± 0.2
		Mg	0.74	± 0.01
<b>BCR-178</b>	Calcium Ammonium Nitrate	water soluble K	417.6	± 0.8
		NH <sub>4</sub> - N	130.44	± 0.32
		NO <sub>3</sub> - N	130.15	± 0.57
		total - N	260.19	± 0.54
<b>BCR-179</b>	Urea	Ca	88.82	± 0.27
		total - N	465.4	± 0.8
		Uric - n	460.9	± 0.9
		Biuret	10.37	± 0.11

Availability: Units of about 100 g in the form of fine powder.

Substance	BCR-126A Lead crystal glass (cg/g)			BCR-126B Lead crystal glass (cg/g)		
SiO <sub>2</sub>	57.80	±	0.11	57.87	±	0.18
PbO	23.98	±	0.06	24.09	±	0.13
K <sub>2</sub> O	9.99	±	0.07	9.98	±	0.13
Al <sub>2</sub> O <sub>3</sub>	0.126	±	0.013	0.137	±	0.027
Fe <sub>2</sub> O <sub>3</sub>	0.005 5	±	0.001 2	0.006 0	±	0.001 6
Sb <sub>2</sub> O <sub>3</sub>	0.291	±	0.012	0.291	±	0.019
BaO	1.053	±	0.030	1.03	±	0.05
CaO	1.033	±	0.030	1.01	±	0.05
MgO	0.512	±	0.013	0.513	±	0.023
ZnO	1.01	±	0.04	1.00	±	0.04
Na <sub>2</sub> O	3.57	±	0.07	3.59	±	0.11
Li <sub>2</sub> O	0.494	±	0.016	0.487	±	0.015
Density at 20 °C	2.990 5	±	0.001 6 g/cm <sup>3</sup>	2.994 7	±	0.002 6 g/cm <sup>3</sup>
Refractive index n <sub>D</sub> <sup>20 °C</sup> at 589 nm	1.559 67	±	0.000 22	1.560 04	±	0.000 18

Availability: In the form of square plates (100 × 100 mm) and 10 mm thickness.

## 5.2 CERTIFIED FOR TRACE ELEMENT CONTENT

	Material	Certified value	Form	Unit
IRMM-521	Ni	< 0.1 mg Co kg <sup>-1</sup>	B: 0.5 mm wire R: 0.1 mm foil	100 cm <sup>2</sup> (1.8 g) 75 cm <sup>2</sup> (6.7 g)
IRMM-522	Cu	< 0.05 mg Co kg <sup>-1</sup> 0.95 ± 0.04 mg Ag kg <sup>-1</sup>	A: 0.1 mm foil B: 1.0 mm foil C: 0.5 mm wire D: 1.0 mm wire	100 cm <sup>2</sup> (8.9 g) 20 cm <sup>2</sup> (17.8 g) 1 m (1.8 g) 1 m (7.0 g)
IRMM-523	Al	< 0.1 mg Na kg <sup>-1</sup>	A: 0.1 mm foil B: 1.0 mm foil C: 1.0 mm wire	100 cm <sup>2</sup> (2.7 g) 20 cm <sup>2</sup> (5.4 g) 1 m (2.1 g)
IRMM-524	Fe	< 0.05 mg Co kg <sup>-1</sup> < 0.1 mg Mn kg <sup>-1</sup>	A: 0.1 mm foil B: 0.5 mm wire	100 cm <sup>2</sup> (7.9 g) 1 m (1.6 g)
IRMM-525	Nb	19.6 ± 1.8 mg Ta kg <sup>-1</sup>	A: 0.02 mm foil C: 0.5 mm wire	20 cm <sup>2</sup> (0.3 g) 1 m (1.7 g)
IRMM-526	Nb	0.30 ± 0.09 mg Ta kg <sup>-1</sup>	A: 0.02 mm foil B: 0.1 mm foil C: 0.5 mm wire	20 cm <sup>2</sup> (0.3 g) 20 cm <sup>2</sup> (1.7 g) 1 m (1.7 g)
IRMM-529	Rh	< 5 g Pt kg <sup>-1</sup> 26.0 ± 0.6 g Ir kg <sup>-1</sup>	0.05 mm foil	20 cm <sup>2</sup> (1.2 g)
IRMM-531	Ti	< 0.1 mg Sc kg <sup>-1</sup>	A: 0.1 mm foil B: 0.5 mm foil C: 0.5 mm wire	100 cm <sup>2</sup> (4.5 g) 20 cm <sup>2</sup> (4.5 g) 1 m (1 g)
IRMM-527R	Al – 0.1% Co	1.001 ± 0.024 g Co kg <sup>-1</sup>	A: 0.1 mm foil B: 0.5 mm wire C: 1.0 mm wire	100 cm <sup>2</sup> (2.7 g) 1 m (0.5 g) 1 m (2.1 g)
IRMM-528R	Al – 1.0% Co	10.02 ± 0.23 g Co kg <sup>-1</sup>	A: 0.1 mm foil C: 1.0 mm wire	100 cm <sup>2</sup> (2.7 g) 1 m (2.1 g)
IRMM-530R	Al – 0.1% Au	1.003 ± 0.012 g Au kg <sup>-1</sup>	A: 0.1 mm foil C: 1.0 mm wire	100 cm <sup>2</sup> (2.7 g) 1 m (2.1 g)
ERM-EB530	Al – 0.1% Au	1.005 ± 0.007 g Au kg <sup>-1</sup>	A: 0.1 mm foil B: 0.5 mm wire C: 1.0 mm wire	50 cm <sup>2</sup> (1.4 g) 1 m (0.5 g) 1 m (2.1 g)
IRMM-532	Al – 0.01% Co	0.100 0 ± 0.002 5 g Co kg <sup>-1</sup>	A: 0.1 mm foil B: 0.5 mm wire C: 1.0 mm wire	100 cm <sup>2</sup> (2.7 g) 1 m (0.5 g) 1 m (2.1 g)
IRMM-533	Al – 0.1% Ag	0.996 ± 0.017 g Ag kg <sup>-1</sup>	A: 0.1 mm foil B: 0.5 mm wire C: 1.0 mm wire	100 cm <sup>2</sup> (2.7 g) 1 m (0.5 g) 1 m (2.1 g)
IRMM-534	Al – 2.0% Sc	19.95 ± 0.20 g Sc kg <sup>-1</sup>	A: 0.1 mm foil B: 0.5 mm wire C: 1.0 mm wire	100 cm <sup>2</sup> (2.7 g) 1 m (0.5 g) 1 m (2.1 g)

	Description	Substance	Certified value (mg/kg)	Form, dimensions <sup>1)</sup> and availability
<b>BCR-017A</b> <b>BCR-017B</b> <b>BCR-022A</b>	Copper	P S O	6.85 ± 0.29 10.4 ± 0.6 138 ± 7	A: ∅ 42 mm, h 30 mm B: chips (bottle with 50 g) ∅ 26 mm, h 9 mm
<b>BCR-022B</b>	Copper (electrolytic tough pitch)	O	138 ± 7	∅ 9 mm, h 50 mm
<b>BCR-054R</b> <b>BCR-058</b>	Copper (low oxygen) Copper (continuous cast)	O O	0.47 ± 0.07 390 ± 24	∅ 7 mm, h 50 mm ∅ 7 mm, h 50 mm
<b>BCR-024B</b> <b>BCR-024C</b> <b>BCR-059A</b> <b>BCR-059B</b> <b>BCR-318</b>	Titanium Titanium alloy Ti6Al4V Titanium	N O O N H	117 ± 13 608 ± 23 1750 ± 70 172 ± 27 12.2 ± 0.6	B: 25 cubes of 0.4 g C: 25 cubes of 0.2 g A: ∅ 26 mm, h 9 mm B: 25 cubes of 0.2 g ∅ 7 mm, h 1 mm (bottle with 75pprox.. 100 discs)
<b>BCR-275</b>	Zirconium alloy Zircaloy-4	O N C	1670 ± 50 39.0 ± 1.7 113 ± 4	∅ 13 mm, h 1 mm (bottle with 10 discs)
<b>BCR-276</b>	Zirconium alloy Zircaloy-4	O N C	1540 ± 80 41 ± 9 108 ± 11	∅ 4.5 mm, h 2 mm (bottle with 75pprox.. 100 discs)
<b>BCR-102</b>	Tungsten carbide powder	O	185 ± 4	Bottles containing 2 – 3 g powder, sealed under argon in an aluminium container

1) ∅ = diameter, h = height

Substance	<b>BCR-286</b> Electrolytically refined lead (mg/kg)	<b>BCR-287</b> Thermally refined lead (mg/kg)	<b>BCR-288</b> Lead with added impurities (mg/kg)
Ag		15.20 ± 0.21	
As			55.7 ± 1.6
Bi	21.5 ± 0.5	67.3 ± 1.1	215.8 ± 2.4
Cd		0.356 ± 0.024	33.3 ± 0.9
Cu		0.98 ± 0.05	19.3 ± 0.4
Sb	0.099 ± 0.021	0.040 ± 0.015	
Se			< 0.2
Te			32.8 ± 1.3
Tl	2.47 ± 0.07	0.73 ± 0.04	2.26 ± 0.08
Zn	< 0.1	< 0.1	8.2 ± 0.4

Availability: CRMs are available as follows: BCR-286A and -287A: blocks of 60 × 60 × 12 mm, BCR-286B, -287B and -288B: chips in bottles containing about 160 g.

Substance	<b>BCR-321</b> Unalloyed zinc (mg/kg)	<b>ERM-EB322</b> Unalloyed zinc (mg/kg)	<b>ERM-EB323</b> Unalloyed zinc (mg/kg)	<b>ERM-EB324</b> Unalloyed zinc (mg/kg)	<b>ERM-EB325</b> Unalloyed zinc (mg/kg)	<b>BCR-326</b> Unalloyed zinc (mg/kg)	<b>BCR-327</b> Unalloyed zinc (mg/kg)
Al	< 0.7						
Cd	(0.23 ± 0.03)	15.08 ± 0.30	6.51 ± 0.21	48.6 ± 1.1	94.7 ± 2.5	203.0 ± 2.0	301.4 ± 2.3
Cu	(0.97 ± 0.05)	5.89 ± 0.15	18.9 ± 0.4	9.87 ± 0.18	47.5 ± 2.0	104.8 ± 2.7	(0.56 ± 0.11)
Fe	(2.22 ± 0.14)	19.1 ± 0.8	11.3 ± 0.7	58.5 ± 1.6	56.1 ± 3.3	264.8 ± 2.1	144.0 ± 1.3
In	< 0.2						
Pb	4.85 ± 0.20	15.0 ± 0.5	48.6 ± 0.9	26.1 ± 0.5	142 ± 9	307.0 ± 1.6	409.4 ± 2.3
Sn	< 0.5	5.6 ± 0.6	18.7 ± 0.7	9.8 ± 0.5	46.1 ± 2.0		
Tl	0.78 ± 0.10	5.28 ± 0.30	10.8 ± 0.5	19.9 ± 0.5	36.8 ± 1.2		

Values in brackets are not certified.

Availability: Discs of 80 mm diameter and 20 mm thickness (BCR-321, -326, -327) and 60 mm diameter, 30 mm thickness, respectively (ERM-EB322, EB323, EB324 and EB325).

Substance	<b>BCR-351</b> ZnAl4 (mg/kg)	<b>BCR-352</b> ZnAl4 (mg/kg)	<b>BCR-353</b> ZnAl4 (mg/kg)	<b>BCR-354</b> ZnAl4 (mg/kg)	<b>BCR-355</b> ZnAl4 (mg/kg)
Al	[43.55 ± 0.11] × 10 <sup>3</sup>	[41.50 ± 0.10] × 10 <sup>3</sup>	[39.5 ± 0.4] × 10 <sup>3</sup>	[37.27 ± 0.16] × 10 <sup>3</sup>	[34.43 ± 0.13] × 10 <sup>3</sup>
Cd	(0.21 ± 0.03)	2.88 ± 0.12	10.44 ± 0.16	29.7 ± 0.4	58.1 ± 0.4
Cu	12.13 ± 0.15	31.26 ± 0.29	100.0 ± 0.8	312.3 ± 2.5	1035 ± 6
In	< 0.2	3.02 ± 0.28	2.55 ± 0.23	9.8 ± 0.9	24.6 ± 1.4
Mg	131.0 ± 0.9	283.0 ± 1.8	452.5 ± 2.4	602 ± 5	786 ± 6
Ni	(1.9 ± 0.6)	6.74 ± 0.16		83.1 ± 2.9	268 ± 8
Pb	4.50 ± 0.20	(6.4 ± 1.6)	24.4 ± 1.3	30.8 ± 1.2	56.9 ± 1.9
Sn	< 1	3.0 ± 0.7	5.6 ± 0.6	14.1 ± 1.1	29.1 ± 2.0
Tl	0.74 ± 0.06	3.2 ± 0.4	3.95 ± 0.22	11.01 ± 0.20	23.25 ± 0.28

Values in brackets ( ) are not certified.

Availability: Discs of 80 mm diameter and 20 mm thickness.

	<b>BCR-356</b> ZnAl4Cu1 (mg/kg)	<b>BCR-357</b> ZnAl4Cu1 (mg/kg)	<b>BCR-360</b> ZnAl4Cu1 (mg/kg)	<b>BCR-361</b> ZnAl4Cu1 (mg/kg)
Al	[44.34 ± 0.11] × 10 <sup>3</sup>	[42.27 ± 0.11] × 10 <sup>3</sup>	[34.27 ± 0.12] × 10 <sup>3</sup>	[40.68 ± 0.19] × 10 <sup>3</sup>
Cd	0.73 ± 0.09	2.83 ± 0.10	59.5 ± 0.6	(0.80 ± 0.17)
Cu	[3.944 ± 0.022] × 10 <sup>3</sup>	[5.849 ± 0.021] × 10 <sup>3</sup>	[12.34 ± 0.05] × 10 <sup>3</sup>	[7.98 ± 0.04] × 10 <sup>3</sup>
Fe	31.5 ± 0.6	25.7 ± 1.2		10.34 ± 0.26
In	< 0.2	3.30 ± 0.14	29.8 ± 0.6	(< 0.2)
Mg	132.3 ± 1.8	273 ± 4	705 ± 5	
Ni	3.43 ± 0.19	9.82 ± 0.25	267 ± 8	
Pb	9.87 ± 0.23	13.8 ± 0.6	73.9 ± 1.4	5.31 ± 0.20
Sn	(0.32 ± 0.16)	3.51 ± 0.14	33.0 ± 0.8	46.3 ± 0.9
Tl	0.79 ± 0.05	2.76 ± 0.05	25.9 ± 0.7	37.4 ± 0.5

Values in brackets ( ) are not certified.

Availability: Discs of 80 mm diameter and 20 mm thickness.

Substance	<b>BCR-089</b> TiAl6V4 (mg/kg)
Al	59700 ± 400
C	38 ± 10
B	
Co	
Cr	122 ± 6
Cu	10.3 ± 1.2
Fe	515 ± 16
H	31 ± 5
Hf	0.126 ± 0.011
Mn	4.2 ± 0.6
Mo	15.2 ± 1.8
N	212 ± 33
Nb	
Ni	106 ± 7
O	1660 ± 60
Sb	1.94 ± 0.12
Sn	10.4 ± 1.7
Ta	0.30 ± 0.09
V	39760 ± 290
W	1.6 ± 0.4
Zr	2.8 ± 0.6

Values in brackets are not certified.

Availability: BCR-089: Cylinder of 40 mm Ø and 20 mm height.

Substance	ERM-EB090a			ERM-EB090b			BCR-090a, BCR-090b		
	Titanium with added impurities [g/kg]			Titanium with added impurities [g/kg]			Titanium with added impurities [g/kg]		
Al	0.78	±	0.05	0.78	±	0.05			
B	( 0.078	±	0.009 )	( 0.078	±	0.007 )	0.0282	±	0.0014
Co	0.457	±	0.017	0.457	±	0.016	0.501	±	0.014
Cr	0.471	±	0.011	0.471	±	0.009	0.533	±	0.011
Cu	0.130	±	0.007	0.130	±	0.005	0.513	±	0.009
Fe	1.82	±	0.05	1.82	±	0.05	0.563	±	0.016
Hf	0.092	±	0.026	0.092	±	0.005			
La	0.0132	±	0.0013	0.0132	±	0.0015			
Mn	0.288	±	0.012	0.288	±	0.010	0.314	±	0.010
Mo	0.484	±	0.022	0.484	±	0.024	0.488	±	0.011
Nb	0.479	±	0.028	0.479	±	0.027	( 0.492	±	0.026 )
Ni	0.406	±	0.020	0.406	±	0.018	0.667	±	0.007
Pd	( 0.108	±	0.015 )	( 0.108	±	0.019 )			
Ru	0.462	±	0.021	0.462	±	0.020			
Si	( 0.16	±	0.06 )	( 0.16	±	0.06 )			
Sn	0.483	±	0.023	0.483	±	0.021	( 0.71	±	0.05 )
Ta	0.097	±	0.005	0.097	±	0.005			
V	0.672	±	0.021	0.672	±	0.022			
W	0.507	±	0.021	0.507	±	0.019	( 0.50	±	0.04 )
Y	( 0.0110	±	0.0010 )	( 0.0110	±	0.0010 )			
Zr	0.509	±	0.015	0.509	±	0.015	( 0.436	±	0.013 )
C	0.325	±	0.022	0.325	±	0.022			
H	0.043	±	0.007	0.043	±	0.005			
N	0.0155	±	0.030	0.0155	±	0.026			
O	3.57	±	0.19	3.57	±	0.19			

Values in brackets are not certified.

Availability BCR-090A: Cylinder of 40 mm Ø and 20 mm height. BCR-090B: Cubes of about 0.2 g in bottles containing approximately 25 g.

ERM-EB090a: Cylinder of 40 mm Ø and 20 mm height. ERM-EB090b 7 g chips of about 250 mg.

Substance	BCR-098					
	Zircaloy-4					
Cr	906	µg/g	±	9	µg/g	
Fe	2143	mg/g	±	0.020	mg/g	
Hf	77.6	µg/g	±	3.0	µg/g	
Sn	14.60	mg/g	±	0.09	mg/g	

Availability: Bottles containing about 10 g of chips.

Substance	BCR-074			ERM-EB074			ERM-EB075		
	Electrolytic copper (OFHC) (mg/kg)			Electrolytic copper (mg/kg)			Electrolytic copper with added impurities (mg/kg)		
Ag	12.8	±	0.7	1.03	±	0.07	10.8	±	0.6
Al							2.3	±	0.4
As	0.78	±	0.14	1.23	±	0.08	3.18	±	0.10
Au				0.52	±	0.06	1.46	±	0.14
Be				0.31	±	0.06	1.08	±	0.24
Bi	(0.10	±	0.03)	0.51	±	0.04	1.79	±	0.11
Cd	< 0.02			0.40	±	0.04	2.69	±	0.09
Co	< 0.05			0.83	±	0.06	2.64	±	0.08
Cr	< 0.1			0.37	±	0.04	1.40	±	0.07
Fe	1.14	±	0.06	5.8	±	0.8	9.3	±	0.4
Hg				(< 0.1)			(< 0.35)		
In				0.49	±	0.07	1.83	±	0.10
Mg				2.03	±	0.27	7.0	±	0.7
Mn	1.27	±	0.05	0.93	±	0.07	1.35	±	0.07
Ni	1.04	±	0.11	0.61	±	0.08	2.18	±	0.16
P				1.53	±	0.25	2.59	±	0.30
Pb	0.97	±	0.05	2.7	±	0.4	4.8	±	0.9
S				(3.3	±	1.0)	25	±	4
Sb	0.576	±	0.030	0.57	±	0.04	2.93	±	0.14
Se	0.37	±	0.04	0.55	±	0.07	1.69	±	0.10
Si							2.6	±	0.4
Sn	< 0.07			(1.5	±	0.4)	2.13	±	0.11
Te	(0.21	±	0.08)	0.50	±	0.06	1.78	±	0.12
Ti				0.97	±	0.18	3.2	±	0.5
W				(< 0.25)			(< 0.1)		
Zn	0.46	±	0.07	2.2	±	0.4	6.51	±	0.29
Zr				(8.8	±	1.7)	(20	±	5)

Values in brackets are not certified.



Availability: CRMs are available as follows: BCR-074A: Cylinder of 40 mm Ø, 30 mm height. ERM-EB074A and ERM-EB075A: Disc of 39 mm Ø, 30 mm height. ERM-EB074B and ERM-EB075B: Cylinder of 8 mm Ø, 100 mm length. ERM-EB074C and ERM-EB075C: 50 g Chips of approximately 250 mg, in amber glass bottle

	Substance	Quaternary bronze (g/kg)	Brass (g/kg)	Arsenic-Copper (g/kg)	Lead-bronze (g/kg)	Tin-bronze (g/kg)
<b>BCR-691</b>	As	1.94 ± 0.10	0.99 ± 0.10	46.0 ± 2.7	2.85 ± 0.22	1.94 ± 0.20
	Pb	79 ± 7	3.9 ± 0.4	1.75 ± 0.14	92 ± 17	2.04 ± 0.18
	Sn	71.6 ± 2.1	20.6 ± 0.7	2.02 ± 0.29	101 ± 8	70 ± 6
	Zn	60.2 ± 2.2	148 ± 5	0.55 ± 0.05	1.48 ± 0.24	1.57 ± 0.25

Availability: Set of five discs (one of each composition) of 35 mm Ø and 2 mm thickness, packed in a box.

	Description	Certified S content (g/kg)	
<b>BCR-331</b>	Steam Coal	4.99	± 0.10
<b>BCR-332</b>	High Volatile Industrial Coal	9.61	± 0.17
<b>BCR-336</b>	High Volatile Steam Coal	32.90	± 0.26

Availability: These CRMs are available in units of about 20 g in ampoules with argon atmosphere.

Substance	<b>BCR-460</b> Total Fluorine in coal powder (mg/kg)		
Cl	(59	±	18)
F	225	±	6

Values in brackets are not certified.

Availability: BCR-460 in glass bottles containing about 40 g.

Substance	<b>BCR-461</b> Fluorine in clay (mg/kg)		
F	568	±	60

Availability: The samples are provided in units of 30 g in glass bottles.

	Description	S content (g/kg)	
<b>ERM-EF672</b>	Gasoil	0.203	± 0.006
<b>ERM-EF671</b>	Gasoil	0.452	± 0.009
<b>ERM-EF104</b>	Gasoil	1.019	± 0.019
<b>BCR-105</b>	Gasoil	3.63	± 0.10
<b>BCR-106</b>	Gasoil	5.02	± 0.08
<b>BCR-107</b>	Gasoil	10.40	± 0.15
<b>ERM-EF211</b>	Petrol	0.048 8	± 0.001 7

Availability: The materials are available in dark glass ampoules sealed under nitrogen. ERM-EF104, -671 and -672 contain 8 mL, BCR-105, -106 and -107 contain 25 g. ERM-EF211 is available in clear borosilicate glass ampoules and contains 19 mL.

	Description	Solvent Yellow 124 (SY124) content (mg/kg)	
<b>ERM-EF317</b>	Gasoil	0.141	± 0.018

Availability: ERM-EF317 is available in dark glass ampoules sealed under nitrogen, containing 20 mL.

	Description	Solvent Yellow 124 (SY124) content (mg/kg)	
<b>ERM-EF318k</b>	Gasoil	8.7	± 0.12

Availability: ERM-EF318k is available as a set of three dark glass ampoules sealed under nitrogen, containing 4.2 mL each.

Certified Parameter	IRMM-441 n-Heptane (%)		IRMM-442 Isooctane (%)	
n-Heptane, purity by difference	99.985	±	0.005	
Isooctane, purity by difference				99.985 ± 0.005
<u>Impurities</u>				
Total organics (other than isooctane)				0.011 ± 0.004
Total organics (other than n-Heptane)	0.012	±	0.005	
Isooctane	0.007	±	0.002	
n-Heptane				0.002 ± 0.002
Water	0.003	±	0.002	0.004 ± 0.002
Lead			< 0.5 µg/L	< 1 µg/L

Availability: IRMM-441 and -442 are supplied in ampoules of 100 mL.

	Description	Substance	Certified values (g/kg)		
<b>BCR-109</b>	Zinc ore (blende)	Pb	7.38	±	0.03
		Fe	145.1	±	0.6
		Cu	9.46	±	0.08
		Cd	4.61	±	0.09
		Mg	0.20	±	0.01
		F	0.081	±	0.004
		Hg	0.00 96	±	0.000 12
<b>BCR-110</b>	Zinc ore (blende)	Pb	97.8	±	0.4
		Fe	5.46	±	0.10
		Cu	16.28	±	0.12
		Cd	10.51	±	0.07
		Mg	1.36	±	0.04
		F	0.055	±	0.003
		Hg	0.148 4	±	0.002 5

Availability: These RMs are contained in brown glass bottles. The approximate quantity per unit is 200 g for BCR-109 and 75 g for BCR-110.

	Description	Substance	Certified values (g/kg)		
<b>BCR-032</b>	Moroccan Phosphate rock	CaO	517.6	±	3.2
		P <sub>2</sub> O <sub>5</sub>	329.8	±	1.7
		CO <sub>2</sub>	51.0	±	0.8
		F	40.4	±	0.6
		SiO <sub>2</sub>	20.9	±	1.2
		SO <sub>3</sub>	18.4	±	0.8
		Al <sub>2</sub> O <sub>3</sub>	5.5	±	0.6
		MgO	4.0	±	0.1
		Fe <sub>2</sub> O <sub>3</sub>	2.3	±	0.1
		As	9.5 × 10 <sup>-3</sup>	±	0.5 × 10 <sup>-3</sup>
		B	22.6 × 10 <sup>-3</sup>	±	2.2 × 10 <sup>-3</sup>
		Cd	20.8 × 10 <sup>-3</sup>	±	0.7 × 10 <sup>-3</sup>
		Cr	257 × 10 <sup>-3</sup>	±	16 × 10 <sup>-3</sup>
		Co	0.59 × 10 <sup>-3</sup>	±	0.06 × 10 <sup>-3</sup>
		Cu	33.7 × 10 <sup>-3</sup>	±	1.4 × 10 <sup>-3</sup>
		Hg	55 × 10 <sup>-6</sup>	±	11 × 10 <sup>-6</sup>
		Mn	18.8 × 10 <sup>-3</sup>	±	1.3 × 10 <sup>-3</sup>
		Ni	34.6 × 10 <sup>-3</sup>	±	1.9 × 10 <sup>-3</sup>
		Ti	171 × 10 <sup>-3</sup>	±	10 × 10 <sup>-3</sup>
		V	153 × 10 <sup>-3</sup>	±	7 × 10 <sup>-3</sup>
Zn	253 × 10 <sup>-3</sup>	±	6 × 10 <sup>-3</sup>		

Availability: Units of about 100 g in the form of fine powder.

Substance	BCR-664 Glass (mg/kg)		
As	5.9	±	0.4
Ba	29.1	±	0.7
Cd	5.7	±	0.4
Cl	68	±	8
Co	2.77	±	0.21
Cr	2.65	±	0.13
Pb	53.1	±	2.6
Sb	24.3	±	1.0
Se	8.6	±	0.5

Availability: Glass plate of (50 x 50 x 7) mm.

Substance	ERM-EC590 Polyethylene (LDPE) g/kg			ERM-EC591 Polypropylene (PP) g/kg		
Br	2.13	±	0.09	2.08	±	0.07
2,4,4'-TriBDE (BDE-28)				0.0025	±	0.0004
2,2',4,4'-TetraBDE (BDE-47)	0.23	±	0.04	0.245	±	0.023
2,2',4,4',5'-PentaBDE (BDE-99)	0.302	±	0.030	0.32	±	0.04
2,2',4,4',6'-PentaBDE (BDE-100)	0.063	±	0.005	0.066	±	0.007
2,2',4,4',5,5'-HexaBDE (BDE-153)	0.047	±	0.006	0.044	±	0.006
2,2',4,4',5,6'-HexaBDE (BDE-154)	0.0257	±	0.0026	0.026	±	0.004
2,2',3,4,4',5,6'-HeptaBDE (BDE-183)	0.132	±	0.012	0.087	±	0.008
2,2',3,3',4,4',6,6'-OctaBDE + 2,2',3,4,4',5,6,6'- OctaBDE (BDE-197+204)	0.076	±	0.010	0.052	±	0.009
DecaBDE (BDE-209)	0.65	±	0.10	0.78	±	0.09
DecaBB (BB-209)	0.63	±	0.10	0.74	±	0.08
Sb	(0.756	±	0.025)	(0.713	±	0.022)

Values in brackets are not certified.

Availability: Brown glass bottle with 20 g granulate.

Substance	ERM-EC680m Polyethylene (low level) mg/kg			ERM-EC681m Polyethylene (high level)		
As	4.7	±	0.4	17.0	±	1.2 mg/kg
Br	181	±	9	1.43	±	0.08 g/kg
Cd	20.8	±	0.9	146	±	5 mg/kg
Cl	(84	±	11)	0.38	±	0.06 g/kg
Cr	9.6	±	0.5	45.1	±	1.9 mg/kg
Hg	2.56	±	0.16	9.9	±	0.8 mg/kg
Pb	11.3	±	0.4	69.7	±	2.5 mg/kg
S	86	±	9	0.64	±	0.10 g/kg
Sb	9.6	±	0.7	86	±	7 mg/kg
Sn	20.7	±	1.6	99	±	6 mg/kg
Zn	194	±	12	1.17	±	0.04 g/kg

Values in brackets are not certified

Availability: Brown glass bottle with 100 g granulate.

### Cd in polyethylene (VDA 001-004)

A set of four certified reference materials for Cd in polyethylene (40.9 mg/kg, 75.9 mg/kg, 197.9 mg/kg and 407 mg/kg) has been certified by the JRC on behalf of VDA (Verband der Automobilindustrie e.V., Frankfurt). Information can be obtained from JRC, Geel (B).

## 5.3 OTHERS

### Antimony implanted in silicon ERM-EG001 (BAM-L001)

Certified quantity	Certified value ( $10^{16} \cdot \text{cm}^{-2}$ )
Areal density of Sb atoms	4.81 ± 0.06
Isotope amount ratio $n(^{121}\text{Sb}) / n(^{123}\text{Sb})$	1.435 ± 0.006

Availability: The sample is a 10 mm x 10 mm silicon chip with a thermally grown surface oxide layer and Sb ions implanted with an energy of 400 keV. The certified value for the areal density of Sb atoms is valid for fractions of the chip surface down to 0.15 mm<sup>2</sup> in size.

### Cementite Grains in Carburised Pure Iron (IRMM-471)

	Certified value (g/kg)
Carbon mass fraction in cementite grains	66.9 ± 2.7

Availability: 4-5 mm long rod with 5 mm diameter.

## 6 MATERIALS RELATED TO ISOTOPIC MEASUREMENTS

### 6.1 CERTIFIED FOR ISOTOPE ABUNDANCE RATIO (AMOUNT RATIO)

BCR-123 Ethanol				
Parameter	Ethanol H	Ethanol M	Ethanol L	
(D/H) <sub>I</sub>	$109.65 \times 10^{-6} \pm 0.20 \times 10^{-6}$	$101.69 \times 10^{-6} \pm 0.17 \times 10^{-6}$	$90.30 \times 10^{-6} \pm 0.18 \times 10^{-6}$	
(D/H) <sub>II</sub>	$119.76 \times 10^{-6} \pm 0.25 \times 10^{-6}$	$130.94 \times 10^{-6} \pm 0.21 \times 10^{-6}$	$122.20 \times 10^{-6} \pm 0.4 \times 10^{-6}$	
R	2.184 ± 0.005	2.575 ± 0.006	2.708 ± 0.009	

Availability: Units of 3 sealed NMR tubes containing respectively H-, M-, and L-ethanols, to which the tetramethylurea internal standard and the C<sub>6</sub>F<sub>6</sub> lock substance are added. 10 mm (BCR-123A) or 15 mm (BCR-123B) O.D. NRM tubes can be supplied.

Parameter	Unit	BCR-656 (96% ethanol)	BCR-657 (Sugar)	BCR-660 (Ethanol in water)
(D/H) <sub>I</sub> by <sup>2</sup> H-NMR	ppm	102.84 ± 0.20		102.90 ± 0.16
(D/H) <sub>II</sub> by <sup>2</sup> H-NMR	ppm	132.07 ± 0.30		131.95 ± 0.23
R by <sup>2</sup> H-NMR		2.570 ± 0.005		2.567 ± 0.005
δ <sup>13</sup> C <sub>V-PDB</sub> by IRMS	‰	-26.91 ± 0.07	-10.76 ± 0.04	-26.72 ± 0.09
(D/H) <sub>w</sub> of water (IRMS)	ppm			148.68 ± 0.14
Alcoholic grade t <sub>D</sub>	w/w %	(94)		11.96 ± 0.06 <sup>1)</sup>

1) in v/v %

Value in brackets is not certified.

Availability: BCR-656: Units of 25 mL of 96 % vol. neutral ethanol from wine in glass bottle;

BCR-657: Units of 81pprox.. 1 g of dry glucose in a sealed amber vial;

BCR-660: Units of 450 mL of aqueous ethanol solution in glass bottle.

Code	Description	Isotope amount content	Amount ratios					Unit size
			$n(^{68}\text{Zn})/n(^{67}\text{Zn})$	$n(^{66}\text{Zn})/n(^{64}\text{Zn})$	$n(^{67}\text{Zn})/n(^{64}\text{Zn})$	$n(^{68}\text{Zn})/n(^{64}\text{Zn})$	$n(^{70}\text{Zn})/n(^{64}\text{Zn})$	
IRMM-007/1	0.5 M HNO <sub>3</sub>	148.261 (49) · 10 <sup>-9</sup> mol ( <sup>64</sup> Zn)·g <sup>-1</sup>	1.070 00 (47)	0.004 679 7(58)	0.021 337 4 (98)	0.022 830 9 (89)	0.000 067 57 (32)	5 mL
007/2		142.842 (47) · 10 <sup>-9</sup> mol ( <sup>64</sup> Zn)·g <sup>-1</sup>	1.033 83 (45)	0.005 275 8 (57)	0.043 039 (20)	0.044 495 (18)	0.000 083 00 (31)	
007/3		125.44 (25) · 10 <sup>-9</sup> mol ( <sup>64</sup> Zn)·g <sup>-1</sup>	1.012 45 (45)	0.007 057 4 (57)	0.107 896 (50)	0.109 239 (45)	0.000 129 11 (32)	
007/4		107.096 (40) · 10 <sup>-9</sup> mol ( <sup>64</sup> Zn)·g <sup>-1</sup>	1.005 44 (45)	0.009 954 0 (60)	0.213 339 (99)	0.214 499 (88)	0.000 204 07 (44)	
007/5		79.518 (32) · 10 <sup>-9</sup> mol ( <sup>64</sup> Zn)·g <sup>-1</sup>	1.001 62 (45)	0.016 608 8 (80)	0.455 60 (21)	0.456 34 (19)	0.000 376 29 (90)	
007/6		45.821 (19) · 10 <sup>-9</sup> mol ( <sup>64</sup> Zn)·g <sup>-1</sup>	0.999 61 (45)	0.035 323 (17)	1.136 83 (52)	1.136 39 (46)	0.000 860 6 (23)	

Code	Description	Amount ratios	Unit size
		$n(^{41}\text{Ca})/n(^{40}\text{Ca})$	
ERM-AE701/1 ERM-AE701/2 ERM-AE701/3 ERM-AE701/4 ERM-AE701/5 ERM-AE701/6 ERM-AE701/7 ERM-AE701/8	0.6 M HNO <sub>3</sub> solution	1.011 4(68) · 10 <sup>-6</sup> 1.023 5(69) · 10 <sup>-7</sup> 1.018 1(69) · 10 <sup>-8</sup> 1.047 9(71) · 10 <sup>-9</sup> 1.052 0(71) · 10 <sup>-10</sup> 1.091 3(74) · 10 <sup>-11</sup> 1.054 9(72) · 10 <sup>-12</sup> 1.052 4(71) · 10 <sup>-13</sup>	25 mL

Code	Description	Isotope amount fraction (-100)					Amount ratios			Unit size	
		<sup>24</sup> Mg	<sup>25</sup> Mg	<sup>26</sup> Mg			$n(^{25}\text{Mg})/n(^{24}\text{Mg})$	$n(^{26}\text{Mg})/n(^{24}\text{Mg})$			
IRMM-009	0.2 M HNO <sub>3</sub> solution									4 mL	
		78.992(25)	10.003(9)	11.005(19)			0.126 63(13)	0.139 32(26)			
IRMM-010	Pt metal	<sup>190</sup> Pt	<sup>192</sup> Pt	<sup>194</sup> Pt	<sup>195</sup> Pt	<sup>196</sup> Pt	<sup>198</sup> Pt	$n(^{190}\text{Pt})/n(^{195}\text{Pt})$	$n(^{192}\text{Pt})/n(^{195}\text{Pt})$	$n(^{194}\text{Pt})/n(^{195}\text{Pt})$	30 mg (wire)
		0.011 7(11)	0.782(17)	32.86(27)	33.78(16)	25.21(23)	7.356(82)	0.000 347(34)	0.023 15(48)	0.973(11)	
IRMM-012	1 M HCl solution	<sup>50</sup> Cr	<sup>52</sup> Cr	<sup>53</sup> Cr	<sup>54</sup> Cr			$n(^{50}\text{Cr})/n(^{52}\text{Cr})$	$n(^{53}\text{Cr})/n(^{52}\text{Cr})$	$n(^{54}\text{Cr})/n(^{52}\text{Cr})$	5 mL
		4.345(9)	83.789(2)	9.501(11)	2.365(5)			0.051 86(10)	0.113 39(15)	0.028 22(06)	
IRMM-016	Li <sub>2</sub> CO <sub>3</sub> solid	<sup>6</sup> Li	<sup>7</sup> Li					$n(^{6}\text{Li})/n(^{7}\text{Li})$			1 g
		7.588 9(75)	92.411 1(75)	9.501(11)	2.365(5)			0.082 121(87)	0.113 39(15)	0.028 22(06)	
IRMM-018°	SiO <sub>2</sub> solid	<sup>28</sup> Si	<sup>29</sup> Si	<sup>30</sup> Si				$n(^{29}\text{Si})/n(^{28}\text{Si})$	$n(^{30}\text{Si})/n(^{28}\text{Si})$		5 g
		92.220 36(49)	4.687 30(36)					0.050 827 2(40)			

## 6.2 CERTIFIED FOR ISOTOPE AMOUNT CONTENT

Code	Description	Isotope amount content	Isotope enrichment	Unit size
IRMM-610	H <sub>3</sub> BO <sub>3</sub> aqueous solution	3.683 11 (88) μmol <sup>10</sup> B·g <sup>-1</sup>	$n(^{10}\text{B})/n(^{11}\text{B}) = 18.80 (2)$	5 mL
IRMM-611	H <sub>3</sub> BO <sub>3</sub> aqueous solution	4.025 (40) μmol <sup>11</sup> B·g <sup>-1</sup>	$n(^{10}\text{B})/n(^{11}\text{B}) = 0.247 26 (32)$	5 mL
IRMM-615	0.5 M HCl solution	3.850 (14) μmol <sup>6</sup> Li·g <sup>-1</sup>	$n(^6\text{Li})/n(^7\text{Li}) = 21.897 (44)$	5 mL
IRMM-618	0.5 M HNO <sub>3</sub> solution	112.13 (17) μmol <sup>87</sup> Rb·kg <sup>-1</sup>	$n(^{85}\text{Rb})/n(^{87}\text{Rb}) = 0.20 498 (24)$	5 mL
IRMM-619	0.5 M HNO <sub>3</sub> solution	85.00 (24) μmol <sup>85</sup> Rb·kg <sup>-1</sup>	$n(^{85}\text{Rb})/n(^{87}\text{Rb}) = 2.593 0 (20)$	5 mL
IRMM-620	4.5 M HCl solution	173.35 (16) μmol <sup>57</sup> Fe·kg <sup>-1</sup>	$n(^{54}\text{Fe})/n(^{57}\text{Fe}) = < 0.0001$ $n(^{56}\text{Fe})/n(^{57}\text{Fe}) = 0.025 39 (31)$ $n(^{58}\text{Fe})/n(^{57}\text{Fe}) = 0.025 16 (18)$	5 mL
IRMM-621	1 M HNO <sub>3</sub> solution	97.35 (15) μmol <sup>111</sup> Cd·kg <sup>-1</sup>	$n(^{106}\text{Cd})/n(^{111}\text{Cd}) = < 0.000 05$ $n(^{108}\text{Cd})/n(^{111}\text{Cd}) = < 0.000 05$ $n(^{110}\text{Cd})/n(^{111}\text{Cd}) = 0.004 44 (42)$ $n(^{112}\text{Cd})/n(^{111}\text{Cd}) = 0.021 74 (10)$ $n(^{113}\text{Cd})/n(^{111}\text{Cd}) = 0.005 818 (56)$ $n(^{114}\text{Cd})/n(^{111}\text{Cd}) = 0.010 875 (88)$ $n(^{116}\text{Cd})/n(^{111}\text{Cd}) = 0.001 629 (44)$	4 mL
IRMM-622	1 M HNO <sub>3</sub> solution	9.739 (18) μmol <sup>111</sup> Cd·kg <sup>-1</sup>	$n(^{106}\text{Cd})/n(^{111}\text{Cd}) = < 0.000 05$ $n(^{108}\text{Cd})/n(^{111}\text{Cd}) = < 0.000 05$ $n(^{110}\text{Cd})/n(^{111}\text{Cd}) = 0.004 44 (42)$ $n(^{112}\text{Cd})/n(^{111}\text{Cd}) = 0.021 74 (10)$ $n(^{113}\text{Cd})/n(^{111}\text{Cd}) = 0.005 818 (56)$ $n(^{114}\text{Cd})/n(^{111}\text{Cd}) = 0.010 875 (88)$ $n(^{116}\text{Cd})/n(^{111}\text{Cd}) = 0.001 629 (44)$	4 mL
IRMM-624	1 M HCl solution	174.84 (42) μmol <sup>50</sup> Cr·kg <sup>-1</sup>	$n(^{52}\text{Cr})/n(^{50}\text{Cr}) = 0.066 41 (50)$ $n(^{53}\text{Cr})/n(^{50}\text{Cr}) = 0.000 323 (64)$ $n(^{54}\text{Cr})/n(^{50}\text{Cr}) = 0.000 11 (11)$	5 mL
IRMM-625	1 M HCl solution	144.233 (90) μmol <sup>52</sup> Cr·kg <sup>-1</sup>	$n(^{50}\text{Cr})/n(^{52}\text{Cr}) = 0.051 85 (20)$ $n(^{53}\text{Cr})/n(^{52}\text{Cr}) = 0.113 33 (38)$ $n(^{54}\text{Cr})/n(^{52}\text{Cr}) = 0.028 35 (34)$	5 mL
IRMM-632	1 M HNO <sub>3</sub> solution	0.096 84 (41) μmol <sup>65</sup> Cu·g <sup>-1</sup>	$n(^{63}\text{Cu})/n(^{65}\text{Cu}) = 0.002 892 1 (92)$	5 mL
ERM-AE633	1 M HNO <sub>3</sub> solution	5.998 (36) μmol <sup>63</sup> Cu·g <sup>-1</sup>	$n(^{65}\text{Cu})/n(^{63}\text{Cu}) = 0.445 63 (42)$	4 – 5 mL
IRMM-634	1.8 M HCl solution	163.61 (38) μmol <sup>56</sup> Fe·kg <sup>-1</sup>	$n(^{54}\text{Fe})/n(^{56}\text{Fe}) = 0.063 70 (27)$ $n(^{57}\text{Fe})/n(^{56}\text{Fe}) = 0.023 096 (72)$ $n(^{58}\text{Fe})/n(^{56}\text{Fe}) = 0.003 071 (29)$	5 mL
ERM-AE637	0.2 M HNO <sub>3</sub> solution	0.791 37(30) μmol <sup>24</sup> Mg·g <sup>-1</sup>	$n(^{26}\text{Mg})/n(^{24}\text{Mg}) = 0.139 68 (32)$ $n(^{25}\text{Mg})/n(^{24}\text{Mg}) = 0.126 86 (18)$	5 mL
ERM-AE638	0.1 M HNO <sub>3</sub> solution	0.857 4 (34) μmol <sup>26</sup> Mg·g <sup>-1</sup>	$n(^{24}\text{Mg})/n(^{26}\text{Mg}) = 0.003 104 (26)$ $n(^{25}\text{Mg})/n(^{26}\text{Mg}) = 0.001 084 (11)$	5 mL
ERM-AE639	0.5 M HCl solution	11.891 (50) μmol <sup>202</sup> Hg·g <sup>-1</sup>	$n(^{196}\text{Hg})/n(^{202}\text{Hg}) = 0.004 972 (46)$ $n(^{198}\text{Hg})/n(^{202}\text{Hg}) = 0.330 6 (21)$ $n(^{199}\text{Hg})/n(^{202}\text{Hg}) = 0.561 9 (28)$ $n(^{200}\text{Hg})/n(^{202}\text{Hg}) = 0.770 5 (28)$ $n(^{201}\text{Hg})/n(^{202}\text{Hg}) = 0.441 26 (88)$ $n(^{204}\text{Hg})/n(^{202}\text{Hg}) = 0.230 27 (75)$	5 mL

<b>ERM-AE640</b>	0.5 M HCl solution	14.71 (11)	nmol $^{202}\text{Hg}\cdot\text{g}^{-1}$	$n(^{196}\text{Hg})/n(^{202}\text{Hg}) = 0.000\ 018\ 09\ (38)$ $n(^{198}\text{Hg})/n(^{202}\text{Hg}) = 0.000\ 623\ (11)$ $n(^{199}\text{Hg})/n(^{202}\text{Hg}) = 0.001\ 603\ (16)$ $n(^{200}\text{Hg})/n(^{202}\text{Hg}) = 0.005\ 499\ (34)$ $n(^{201}\text{Hg})/n(^{202}\text{Hg}) = 0.013\ 351\ (52)$ $n(^{204}\text{Hg})/n(^{202}\text{Hg}) = 0.002\ 595\ (21)$	5 mL
<b>ERM-AE641</b>	Cl in water	18.959 (15)	$\mu\text{mol } ^{35}\text{Cl}\cdot\text{g}^{-1}$	$n(^{37}\text{Cl})/n(^{35}\text{Cl}) = 0.319\ 77\ (83)$	4 – 5 mL
<b>ERM-AE642</b>	Cl in water	4.375 (26)	$\mu\text{mol } ^{37}\text{Cl}\cdot\text{g}^{-1}$	$n(^{35}\text{Cl})/n(^{37}\text{Cl}) = 0.019\ 14\ (48)$	4 – 5 mL
<b>IRMM-643</b>	2.8 M $\text{HNO}_3$ solution	334.33 (84)	$\mu\text{mol } ^{32}\text{S}\cdot\text{kg}^{-1}$	$n(^{33}\text{S})/n(^{32}\text{S}) = 0.007\ 877\ 6\ (58)$ $n(^{34}\text{S})/n(^{32}\text{S}) = 0.044\ 149\ 3\ (78)$ $n(^{36}\text{S})/n(^{32}\text{S}) = 0.000\ 153\ 40\ (94)$	5 mL
<b>IRMM-644</b>	3.2 M $\text{HNO}_3$ solution	326.28 (80)	$\mu\text{mol } ^{32}\text{S}\cdot\text{kg}^{-1}$	$n(^{33}\text{S})/n(^{32}\text{S}) = 0.007\ 969\ 8\ (70)$ $n(^{34}\text{S})/n(^{32}\text{S}) = 0.045\ 162\ 2\ (82)$ $n(^{36}\text{S})/n(^{32}\text{S}) = 0.000\ 170\ 0\ (58)$	5 mL
<b>IRMM-645</b>	2.8 M $\text{HNO}_3$ solution	371.96 (57)	$\mu\text{mol } ^{32}\text{S}\cdot\text{kg}^{-1}$	$n(^{33}\text{S})/n(^{32}\text{S}) = 0.007\ 747\ 6\ (38)$ $n(^{34}\text{S})/n(^{32}\text{S}) = 0.042\ 747\ 3\ (62)$ $n(^{36}\text{S})/n(^{32}\text{S}) = 0.000\ 145\ 1\ (42)$	5 mL
<b>IRMM-646</b>	2.8 M $\text{HNO}_3$ solution	4586 (27)	$\mu\text{mol } ^{34}\text{S}\cdot\text{kg}^{-1}$	$n(^{32}\text{S})/n(^{34}\text{S}) = 0.038\ 314\ 9\ (31)$ $n(^{33}\text{S})/n(^{34}\text{S}) = 0.000\ 470\ 88\ (15)$ $n(^{36}\text{S})/n(^{34}\text{S}) = 0.000\ 018\ 1\ (37)$	5 mL
<b>ERM-AE647</b>	1 M $\text{HNO}_3$ solution	134.974 (73)	$\mu\text{mol } ^{63}\text{Cu}\cdot\text{g}^{-1}$	$n(^{65}\text{Cu})/n(^{63}\text{Cu}) = 0.445\ 60\ (74)$	4 mL
<b>ERM-AE649</b>	1 M $\text{HNO}_3$ solution	0.836 88 (27)	$\mu\text{mol } ^{205}\text{Tl}\cdot\text{g}^{-1}$	$n(^{203}\text{Tl})/n(^{205}\text{Tl}) = 0.418\ 91\ (18)$	4 – 5 mL
<b>IRMM-651</b>	0.5 M $\text{HNO}_3$ solution	0.077 506 (30)	$\mu\text{mol } ^{64}\text{Zn}\cdot\text{g}^{-1}$	$n(^{66}\text{Zn})/n(^{64}\text{Zn}) = 0.557\ 17\ (30)$ $n(^{67}\text{Zn})/n(^{64}\text{Zn}) = 0.080\ 702\ (34)$ $n(^{68}\text{Zn})/n(^{64}\text{Zn}) = 0.366\ 27\ (12)$ $n(^{70}\text{Zn})/n(^{64}\text{Zn}) = 0.011\ 981\ (22)$	5 mL
<b>IRMM-652</b>	0.5 M $\text{HNO}_3$ solution	0.156 000 (50)	$\mu\text{mol } ^{64}\text{Zn}\cdot\text{g}^{-1}$	$n(^{66}\text{Zn})/n(^{64}\text{Zn}) = 0.004\ 107\ 3\ (59)$ $n(^{67}\text{Zn})/n(^{64}\text{Zn}) = 0.000\ 499\ 87\ (96)$ $n(^{68}\text{Zn})/n(^{64}\text{Zn}) = 0.002\ 029\ 5\ (23)$ $n(^{70}\text{Zn})/n(^{64}\text{Zn}) = 0.000\ 052\ 76\ (34)$	5 mL
<b>IRMM-653</b>	0.5 M $\text{HNO}_3$ solution	0.138 014 (60)	$\mu\text{mol } ^{67}\text{Zn}\cdot\text{g}^{-1}$	$n(^{64}\text{Zn})/n(^{67}\text{Zn}) = 0.013\ 191\ 5\ (81)$ $n(^{66}\text{Zn})/n(^{67}\text{Zn}) = 0.024\ 551\ 6\ (70)$ $n(^{68}\text{Zn})/n(^{67}\text{Zn}) = 0.051\ 086\ (36)$ $n(^{70}\text{Zn})/n(^{67}\text{Zn}) = 0.000\ 527\ 8\ (18)$	5 mL
<b>IRMM-654</b>	0.5 M $\text{HNO}_3$ solution	0.146 098 (48)	$\mu\text{mol } ^{68}\text{Zn}\cdot\text{g}^{-1}$	$n(^{64}\text{Zn})/n(^{68}\text{Zn}) = 0.00\ 489\ 4\ (38)$ $n(^{66}\text{Zn})/n(^{68}\text{Zn}) = 0.003\ 186\ 8\ (46)$ $n(^{68}\text{Zn})/n(^{68}\text{Zn}) = 0.001\ 411\ 3\ (17)$ $n(^{70}\text{Zn})/n(^{68}\text{Zn}) = 0.000\ 194\ 98\ (78)$	5 mL
<b>ERM-AE671</b>	$\text{CH}_3^{202}\text{HgCl}$ in 2 % ethanol/water solution	0.015 1 (7)	$\mu\text{mol } \text{CH}_3^{202}\text{HgCl}\cdot\text{g}^{-1}$	$n(^{196}\text{Hg})/n(^{202}\text{Hg}) = 0.000\ 018$ $n(^{198}\text{Hg})/n(^{202}\text{Hg}) = 0.000\ 62$ $n(^{199}\text{Hg})/n(^{202}\text{Hg}) = 0.001\ 60$ $n(^{200}\text{Hg})/n(^{202}\text{Hg}) = 0.005\ 50$ $n(^{201}\text{Hg})/n(^{202}\text{Hg}) = 0.013\ 4$ $n(^{204}\text{Hg})/n(^{202}\text{Hg}) = 0.002\ 60$	5 g
<b>IRMM-3702</b>	1 M $\text{HNO}_3$ solution	1.512 (30)	$\mu\text{mol } ^{64}\text{Zn}\cdot\text{g}^{-1}$	$n(^{66}\text{Zn})/n(^{64}\text{Zn}) = 0.563\ 97\ (30)$ $n(^{67}\text{Zn})/n(^{64}\text{Zn}) = 0.082\ 166\ (35)$ $n(^{68}\text{Zn})/n(^{64}\text{Zn}) = 0.375\ 19\ (16)$ $n(^{70}\text{Zn})/n(^{64}\text{Zn}) = 0.012\ 418\ (23)$	3 mL

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## ALPHABETICAL LIST

DESIGNATION	ERM / CRM	PAGE NO.
$\gamma$ -GLUTAMYLTRANSFERASE (catalytic concentration)	ERM-AD452/IFCC	63
10-AZABENZO[a]PYRENE (purity)	BCR-092	4
1-METHYLBENZ[a]ANTHRACENE (purity)	BCR-093R	4
1-METHYLCHRYSENE (purity)	BCR-077R	4
1-NITRONAPHTALENE (purity)	BCR-306	5
1-NITROPYRENE (purity)	BCR-305	5
2,2',3,4,4',5,5'-HEPTACHLOROBIPHENYL (IUPAC No. 180) (purity)	BCR-298	5
2,2',3,4,4',5'-HEXACHLOROBIPHENYL (IUPAC No. 138) (purity)	BCR-296	5
2,2',4,4',5,5'-HEXACHLOROBIPHENYL (IUPAC No. 153) (purity)	BCR-297	5
2,2',5,5'-TETRACHLOROBIPHENYL (IUPAC No. 52) (purity)	BCR-293	5
2,3,3'-TRICHLOROBIPHENYL (IUPAC No. 20) (purity)	BCR-290	5
2,4,4'-TRICHLOROBIPHENYL (IUPAC No. 28) (purity)	BCR-291	5
2,4'-DICHLOROBIPHENYL (IUPAC No. 8) (purity)	BCR-289	5
2,4-DINITROPHENYLHYDRAZONES in ACETONITRILE	BCR-551	58
2,4-DINITROPHENYLHYDRAZONES in ACETONITRILE (blank)	BCR-552	58
2-METHYLCHRYSENE (purity)	BCR-078R	4
2-NITRO-7-METHOXYNAPHTHO[2,1-b]FURAN (purity)	BCR-312	5
2-NITRONAPHTALENE (purity)	BCR-307	5
3 REFERENCE ETHANOLS (H, M, L) (for SNIF-NMR)	BCR-123A, B	29, 81
3,3',5 TRIIODOTHYRONINE (T3)	IRMM-469	58
3-METHYLCHRYSENE (purity)	BCR-079R	4
3-NITROFLUORANTHENE (purity)	BCR-310	5
4-DEOXYNIVALENOL in acetonitrile	IRMM-315	31
4-METHYLCHRYSENE (purity)	BCR-080R	4
5-METHYLCHRYSENE (purity)	BCR-081R	4
6-METHYLCHRYSENE (purity)	ERM-AC082	5
6-NITROBENZO[a]PYRENE (purity)	BCR-311	5
6-NITROCHRYSENE (purity)	BCR-309	5
7H-DIBENZO (c.g) CARBAZOLE (purity)	BCR-266	4
9-NITROANTHRACENE (purity)	BCR-308	5
ABETA 42 IN CEREBROSPINAL FLUID (CSF) (high level)	ERM-DA482/IFCC	61
ABETA 42 IN CEREBROSPINAL FLUID (CSF) (low level)	ERM-DA480/IFCC	61
ABETA 42 IN CEREBROSPINAL FLUID (CSF) (medium level)	ERM-DA481/IFCC	61
ACETALDEHYDE-2,4-DINITROPHENYLHYDRAZONE (purity)	BCR-547	58
ACETONE-2,4-DINITROPHENYLHYDRAZONE (purity)	BCR-549	58
ACROLEIN-2,4-DINITROPHENYLHYDRAZONE (purity)	BCR-548	58
AFLATOXIN B1 IN ACETONITRILE	ERM-AC057	30
AFLATOXIN B2 IN ACETONITRILE	ERM-AC058	30
AFLATOXIN G1 IN ACETONITRILE	ERM-AC059	30
AFLATOXIN G2 IN ACETONITRILE	ERM-AC060	30
AFLATOXIN M1 STANDARD SOLUTION	BCR-423 (RM)	29
Al	IRMM-523	74
Al-0.01 % Co	IRMM-532	74
Al-0.1 % Ag	IRMM-533	74
Al-0.1 % Au	IRMM-530R	74
Al-0.1 % Au (0.1 mm foil)	ERM-EB530A	74
Al-0.1 % Au (0.5 mm wire)	ERM-EB530B	74
Al-0.1 % Au (1.0 mm wire)	ERM-EB530C	74
Al-0.1 % Co	IRMM-527R	74

Al-1.0 % Co	IRMM-528R	74
Al-2.0 % Sc	IRMM-534	74
ALANINE AMINOTRANSFERASE (ALT)	ERM-AD454k/IFCC	63
ALPHA ALUMINA (0.10 m <sup>2</sup> /g) (nitrogen BET specific surface area)	BCR-169	69
ALPHA ALUMINA (1.05 m <sup>2</sup> /g) (nitrogen BET specific surface area)	BCR-170	69
ALUMINA (2.95 m <sup>2</sup> /g) (nitrogen BET specific surface area)	BCR-171	69
ANHYDROUS BUTTER FAT (tracers)	BCR-633	48
ANIMAL FEED (Organochlorine pesticides)	BCR-115	42
ANTHANTHRENE (purity)	BCR-091	4
ANTIMONY IMPLANTED IN SILICON	ERM-EG001	81
APPLE (dietary fibre)	ERM-BC516	50
AQUATIC PLANT (Cr)	BCR-596	16
ARSENOBETAINE IN WATER	ERM-AC626	29
ARTIFICIAL FOODSTUFF (major nutrients)	BCR-644	49
ARTIFICIAL FOODSTUFF (major nutrients)	BCR-645	49
ASPARTATE TRANSAMINASE (AST)	ERM-AD457/IFCC	63
BACILLUS CEREUS (number of colony forming particles)	BCR-528	52
BCR-ABL pDNA CALIBRANT	ERM-AD623	63
BEECH WOOD	BCR-683	27
BEEF-PORK FAT BLEND (fatty acid profile)	BCR-163	48
BEER (EtOH, low level)	BCR-651	49
BEER (EtOH, very low level)	BCR-652	49
BENZ[a]ACRIDINE (purity)	BCR-157	4
BENZ[a]ANTHRACENE (purity)	BCR-271	4
BENZ[c]ACRIDINE (purity)	BCR-158	4
BENZO[a]FLUORANTHENE (purity)	BCR-097	4
BENZO[a]FLUORENONE (purity)	BCR-342	5
BENZO[A]PYRENE (purity)	ERM-AC051	5
BENZO[b]CHRYSENE (purity)	BCR-046	4
BENZO[b]FLUORANTHENE (purity)	BCR-047	4
BENZO[b]NAPHTHO (1,2-d) FURAN (purity)	BCR-340	5
BENZO[b]NAPHTHO (2,1-d) FURAN (purity)	BCR-341	5
BENZO[b]NAPHTHO[1,2-d]THIOPHENE (purity)	BCR-137R	4
BENZO[b]NAPHTHO[2,3-d]THIOPHENE (purity)	BCR-136R	4
BENZO[c,d]PYREN-6-ONE (purity)	BCR-339	5
BENZO[c]CHRYSENE (purity)	BCR-140	4
BENZO[c]PHENANTHRENE (purity)	BCR-134	4
BENZO[e]PYRENE (purity)	BCR-050	4
BENZO[gh]FLUORANTHENE (purity)	BCR-139	4
BENZO[gh]PERYLENE (purity)	BCR-052	4
BENZO[j]FLUORANTHENE (purity)	BCR-049	4
BENZO[k]FLUORANTHENE (purity)	BCR-048R	4
BIODIESEL	ERM-EF001	72
BIODIESEL (B100 Rapeseed)	ERM-EF002	65, 72
BLADDERWRACK ( <i>Fucus vesiculosus</i> ) (trace elements)	ERM-CD200	17
BORON (natural) spike, aqueous solution	IRMM-611	83
BORON-10 spike, aqueous solution	IRMM-610	83
BOVINE BLOOD (Pb, Cd)	ERM-CE195	60
BOVINE BLOOD (Pb, Cd)	ERM-CE196	60
BOVINE BLOOD LYSATE (haemoglobincyanide)	BCR-522	62
BOVINE EYE (CLENBUTEROL BLANK)	BCR-673	55
BOVINE EYE (CLENBUTEROL POSITIVE)	BCR-674	55
BOVINE LIVER (CLENBUTEROL BLANK)	BCR-648	55
BOVINE LIVER (CLENBUTEROL POSITIVE)	BCR-649	55
BOVINE LIVER (trace elements)	ERM-BB185	45

BOVINE LIVER (trace elements)	BCR-185R	45
BOVINE LIVER (trenbolone blank and positive)	BCR-474-5	55
BOVINE MUSCLE (diethylstilbestrol blank)	BCR-412	55
BOVINE MUSCLE (trace elements)	ERM-BB184	45
BOVINE URINE (diethylstilboestrol, dienioestrol and hexoestrol)	ERM-BB389	55
BOVINE URINE (diethylstilboestrol, dienioestrol and hexoestrol) (blank)	ERM-BB386	55
BOVINE URINE (clenbuterol and salbutamol)	BCR-502	54
BOVINE URINE (clenbuterol and salbutamol)	BCR-503	54
BOVINE URINE (clenbuterol and salbutamol)	BCR-504	54
BRAN BREAKFAST CEREAL (dietary fibre)	ERM-BD518	50
BROWN BREAD (trace elements)	BCR-191	46
BROWN COAL	ERM-EF412	66
BRUSSELS SPROUT (vitamins)	BCR-431	49
CADMIUM-111 spike, nitrate solution	IRMM-621	83
CADMIUM-111 spike, nitrate solution	IRMM-622	83
CALCAREOUS SOIL	ERM-CC690	13
CALCIUM AMMONIUM NITRATE FERTILIZER (composition)	BCR-178	73
CALCIUM-41 isotopic, nitrate solution (set of 8 units)	ERM-AE701	82
CANDIDA ALBICANS (NCPF 3179)	IRMM-354	54
CARROT (dietary fibre)	ERM-BC515	50
CEMENTITE GRAINS IN CARBURISED PURE IRON	IRMM-471	81
CHANNEL SEDIMENT (trace elements)	BCR-320R	14
CHARPY SPECIMENS 120 J (impact toughness)	ERM-FA016	68
CHARPY SPECIMENS 150 J (impact toughness)	ERM-FA415	68
CHARPY SPECIMENS 80 J (impact toughness)	ERM-FA015	68
CHARPY SPECIMENS Low Energy 0°C (impact toughness)	ERM-FA013	68
CHARPY SPECIMENS Low Energy 20°C (impact toughness)	ERM-FA013	68
CHEESE (SEA)	IRMM-359	44
CHLORIDE (natural) spike, chloride solution	ERM-AE641	84
CHLORIDE-37 spike, chloride solution	ERM-AE642	84
CHROMIUM (natural) spike, chloride solution	IRMM-625	83
CHROMIUM, isotopic, chloride solution	IRMM-012	82
CHROMIUM-50 spike, chloride solution	IRMM-624	83
CHRYSENE (purity)	BCR-269	4
CLAY (F)	BCR-461	78
COAL (F)	BCR-460	78
COASTAL SEAWATER (Hg)	BCR-579	19
COASTAL SEDIMENT (butyltins)	BCR-462	23
COCOA BUTTER	IRMM-801	48
COCONUT OIL (PAH blank)	BCR-459	40
COD LIVER OIL (Organochlorine pesticides)	BCR-598	41
COD LIVER OIL (PCBs)	BCR-349	41
COLLOIDAL SILICA (particle size)	ERM-FD100	69
COLLOIDAL SILICA (particle size)	ERM-FD304	70
COLLOIDAL SILICA IN AQUEOUS SOLUTION (nanoparticles)	ERM-FD101b	70
COLLOIDAL SILICA IN AQUEOUS SOLUTION (particle size)	ERM-FD102	70
COMPOUND FEED (aflatoxin B1 blank)	BCR-375	43
COMPOUND FEEDINGSTUFF (high level)	ERM-BE376	43
COMPOUND FEEDINGSTUFF (very low level)	ERM-BE375	43
CONTINUOUS CAST COPPER (O)	BCR-058	75
COPPER (natural) spike, nitrate solution	ERM-AE633	83
COPPER (O)	BCR-054R	75
COPPER (S, P)	BCR-017A, B	75
COPPER ALLOYS	BCR-691	78

COPPER-63, nitrate solution	ERM-AE647	84
COPPER-65 spike, nitrate solution	IRMM-632	83
CORONENE (purity)	BCR-272	4
CORTISOL REFERENCE SERUM PANEL	ERM-DA451/IFCC	59
CORUNDUM	ERM-FD066	68
CORUNDUM	ERM-FD069	68
CREATINE KINASE ISOENZYME MM (CK-MM)	ERM-AD455k/IFCC	63
CREATININE (interfering substances)	BCR-573i	62
Cu	IRMM-522	74
CUCUMBER (pesticides)	ERM-BC403	44
DAIRY FEED (nutritional properties)	BCR-708	50
DARK CHOCOLATE	ERM-BD512	47
DEFATTED PEANUT MEAL (aflatoxin B1, blank)	BCR-262R	43
DEFATTED PEANUT MEAL (aflatoxin B1, high level)	BCR-264	43
DEFATTED PEANUT MEAL (aflatoxin B1, medium level)	BCR-263R	43
DIBENZ[a,c]ACRIDINE (99mylas)	BCR-155	4
DIBENZ[a,h]ACRIDINE (purity)	BCR-153R	4
DIBENZ[a,i]ACRIDINE (99mylas)	BCR-152	4
DIBENZ[a,j]ACRIDINE (purity)	BCR-154	4
DIBENZ[a,c]ANTHRACENE (purity)	BCR-094	4
DIBENZ[a,j]ANTHRACENE (purity)	BCR-095	4
DIBENZ[c,h]ACRIDINE (purity)	BCR-156R	4
DIBENZO[a,e]FLUORANTHENE (99mylas)	BCR-265	4
DIBENZO[a,h]PYRENE (99mylas)	BCR-159	4
DIBENZO[a,e]PYRENE (99mylas)	BCR-133	4
DIBENZO[a,h]ANTHRACENE (purity)	BCR-138	4
DIBENZO[a,i]PYRENE (99mylas)	BCR-096	4
DIBENZO[b,d]FURAN (purity)	BCR-337	5
DIESEL (B7)	ERM-EF003	72
DIESEL (B7)	ERM-EF004	65, 72
EGG POWDER	ERM-BB125	55
ELECTROLYTIC COPPER WITH ADDED IMPURITIES (trace elements)	ERM-EB075A-B-C	77
ELECTROLYTIC COPPER (trace elements)	ERM-EB074A-B-C	77
ELECTROLYTIC COPPER (trace elements)	BCR-074A	77
ELECTROLYTIC TOUGH PITCH COPPER (O)	BCR-022A, B	75
ELECTROLYTICALLY REFINED LEAD (trace elements)	BCR-286A, B	75
ENTEROCOCCUS FAECALIS (CIP 106877)	IRMM-355	54
ESCHERICHIA COLI 0157 (NCTC 12900)	IRMM-351	53
ESTUARINE SEDIMENT	BCR-667	13
ESTUARINE SEDIMENT (Hg, methylmercury)	ERM-CC580	14, 23
ESTUARINE SEDIMENT (trace elements)	BCR-277R	14
ESTUARINE WATER (trace elements)	BCR-505	19
EWES/GOATS' CURD (for adulteration with cows' milk) 0 and 1 % cows' milk	BCR-599	56
FAUJASITE TYPE ZEOLITE (micropore volume and width)	BCR-704	69
Fe	IRMM-524	74
FINE DUST (PM <sub>10</sub> -like) (elements)	ERM-CZ120	15
FINE DUST (PM <sub>10</sub> -like) (PAHs)	ERM-CZ100	24
FISH MUSCLE (trace elements)	ERM-BB422	45
FISH OIL	ERM-BB350	41
FISH TISSUE	ERM-CE100	28
FISH TISSUE (PBDEs fish in tissue)	ERM-CE102	28
FLUORANTHENE (purity)	BCR-160R	4
FLY ASH (LOW LEVEL) (PCDDs and PCDFs)	BCR-615	26
FLY ASH (PCDDs and PCDFs)	BCR-490	26
FLY ASH (trace elements)	BCR-176R	15

FLY ASH FROM PULVERISED COAL (trace elements)	BCR-038	15
FORMALDEHYDE-2,4-DINITROPHENYLHYDRAZONE (purity)	BCR-546	58
FORMALDEHYDE-2,4-DINITROPHENYLHYDRAZONE on filter	BCR-553	58
FORMALDEHYDE-2,4-DINITROPHENYLHYDRAZONE on filter (blank)	BCR-554	58
FRESH WATER (nitrate, high level)	BCR-480	20
FRESH WATER (nitrate, low level)	BCR-479	20
FRESHWATER HARBOUR SEDIMENT (PAHs)	BCR-535	25
FRESHWATER HARBOUR SEDIMENT (PCBs)	BCR-536	25
FRESHWATER SEDIMENT	ERM-CC537a	28
FRESHWATER SEDIMENT (butyltin and phenyltin compounds)	BCR-646	23
FULL FAT SOYA (dietary fibre)	ERM-BC517	50
FURNACE COKE	ERM-EF413	66
GAS OIL (0.0203 % S)	ERM-EF672	78
GAS OIL (0.0452 % S)	ERM-EF671	78
GAS OIL (0.1019 % S)	ERM-EF104	78
GAS OIL (0.363 % S)	BCR-105	78
GAS OIL (0.502 % S)	BCR-106	78
GAS OIL (1.040 % S)	BCR-107	78
GAS OIL (CFPP and CP)	ERM-FC395k	65
GAS OIL (Solvent Yellow 124)	ERM-EF317	78
GAS OIL (Solvent Yellow 124)	ERM-EF318k	78
GENETICALLY MODIFIED AM04-1020 POTATO	ERM-BF430	37
GENETICALLY MODIFIED AV43-6-G7 POTATO	ERM-BF431	38
GENETICALLY MODIFIED DAS-81910-7 COTTON	ERM-BF440	40
GENETICALLY MODIFIED DP-ØØ4114-3 MAIZE	ERM-BF439	40
GENETICALLY MODIFIED VCO-Ø1981-5 MAIZE	ERM-BF438	39
GENETICALLY MODIFIED 1507 MAIZE	ERM-BF418	34
GENETICALLY MODIFIED 281-24-236 X 3006-210-23 COTTON SEED	ERM-BF422	35
GENETICALLY MODIFIED 3272 MAIZE	ERM-BF420	34
GENETICALLY MODIFIED 59122 MAIZE	ERM-BF424	35
GENETICALLY MODIFIED 73496 RAPESEED	ERM-BF434	38
GENETICALLY MODIFIED 98140 MAIZE	ERM-BF427	36
GENETICALLY MODIFIED Bt-11 MAIZE	ERM-BF412k	32
GENETICALLY MODIFIED Bt-176 MAIZE	ERM-BF411	31
GENETICALLY MODIFIED DAS-40278-9 MAIZE	ERM-BF433	38
GENETICALLY MODIFIED DAS-44406-6 SOYA	ERM-BF436	39
GENETICALLY MODIFIED DAS-81419-2 SOYA	ERM-BF437	39
GENETICALLY MODIFIED EH92-527-1 POTATO	ERM-BF421	35
GENETICALLY MODIFIED GA21 MAIZE	ERM-BF414	33
GENETICALLY MODIFIED GHB119 COTTON	ERM-BF428	37
GENETICALLY MODIFIED H7-1 SUGAR BEET	ERM-BF419	34
GENETICALLY MODIFIED MIR604 MAIZE	ERM-BF423	35
GENETICALLY MODIFIED MON 810 MAIZE	ERM-BF413k	32
GENETICALLY MODIFIED MON 863 MAIZE	ERM-BF416	33
GENETICALLY MODIFIED MON 863 x MON 810 MAIZE	ERM-BF417	34
GENETICALLY MODIFIED NK603 MAIZE	ERM-BF415	33
GENETICALLY MODIFIED PH05-026-0048 POTATO	ERM-BF435	39
GENETICALLY MODIFIED ROUNDUP READY SOYA	ERM-BF410p	31
GENETICALLY MODIFIED SOYA 305423	ERM-BF426	36
GENETICALLY MODIFIED SOYA 356043	ERM-BF425	36
GENETICALLY MODIFIED SOYA DAS-68416-4	ERM-BF432	38
GENETICALLY MODIFIED T304-40 COTTON	ERM-BF429	37
Genomic DNA of Bacillus licheniformis DSM 5749	IRMM-311	52
Genomic DNA of Bacillus subtilis DSM 5750	IRMM-312	52

Genomic DNA of Campylobacter coli (CNET068) and Campylobacter jejuni (CNET112)	IRMM-313	53
Genomic DNA of Campylobacter jejuni	IRMM-448	54
Genomic DNA of Escherichia coli	IRMM-449	54
Genomic DNA of Listeria monocytogenes	IRMM-447	54
GLASS (trace elements)	BCR-664	80
GLASS-CERAMIC	BCR-724A-D	65
GLUTARALDEHYDE-2,4-DINITROPHENYLHYDRAZONE (purity)	BCR-550	58
GROUND WATER	ERM-CA615	21
GROUND WATER	ERM-CA616	20
GROUND WATER (Br, high level)	BCR-611	20
GROUND WATER (Br, low level)	BCR-612	20
HAEMOGLOBIN HbA0	IRMM/IFCC-467	62
HAEMOGLOBIN IN BUFFER	ERM-AD500/IFCC	62
HARD COAL	ERM-EF411	66
HARICOTS BEANS (dietary fibre)	ERM-BC514	50
HARICOTS VERTS (major nutrients)	BCR-383	47, 50
HAY POWDER (elements)	BCR-129	16
HERRING (PCBs)	BCR-718	27
HIGH VOLATILE INDUSTRIAL COAL (S)	BCR-332	78
HIGH VOLATILE STEAM COAL (S)	BCR-336	78
HIPPOGLOSSUS HIPPOGLOSSUS (ATLANTIC HALIBUT) - FISH POWDER	EURM-020	57
HUMAN ADENOSINE DEAMINASE (ADA 1)	BCR-647	63
HUMAN APOLIPOPROTEIN A I (mass concentration)	BCR-393	61
HUMAN BLOOD (Pb, Cd)	BCR-634	60
HUMAN BLOOD (Pb, Cd)	BCR-635	60
HUMAN BLOOD (Pb, Cd)	BCR-636	60
HUMAN HAIR (trace elements)	ERM-DB001	60
HUMAN PANCREATIC LIPASE (from pancreatic juice)	BCR-693	63
HUMAN PANCREATIC LIPASE (recombinant)	BCR-694	63
HUMAN SERUM (17 $\beta$ -ESTRADIOL, high level)	BCR-578	59
HUMAN SERUM (17 $\beta$ -ESTRADIOL, low level)	BCR-576	59
HUMAN SERUM (17 $\beta$ -ESTRADIOL, medium level)	BCR-577	59
HUMAN SERUM (Al, Se, Zn)	BCR-637	60
HUMAN SERUM (Al, Se, Zn)	BCR-638	60
HUMAN SERUM (Al, Se, Zn)	BCR-639	60
HUMAN SERUM (Ca, Mg, Li)	BCR-304	60
HUMAN SERUM (cortisol spiked)	ERM-DA193	59
HUMAN SERUM (cortisol unspiked)	ERM-DA192	59
HUMAN SERUM (CRP)	ERM-DA474/IFCC	61
HUMAN SERUM (cystatin C)	ERM-DA471/IFCC	61
HUMAN SERUM (high creatinine)	BCR-575	62
HUMAN SERUM (high progesterone)	BCR-348R	59
HUMAN SERUM (low creatinine)	BCR-573	62
HUMAN SERUM (medium creatinine)	BCR-574	62
HUMAN SERUM (progesterone)	ERM-DA347	59
HUMAN SERUM (proteins)	ERM-DA470k/IFCC	61
IgG ANTI-MPO IN HUMAN SERUM	ERM-DA476/IFCC	61
IgG PR3 ANCA IN HUMAN SERUM	ERM-DA483/IFCC	61
INDENO[1,2,3-cd]FLUORANTHENE (purity)	BCR-267	4
INDENO[1,2,3-CD]PYRENE (purity)	ERM-AC053	5
INDUSTRIAL CLAY SOIL (PCDDs, PCDFs)	BCR-530	25
INDUSTRIAL SANDY SOIL (PCDDs, PCDFs)	BCR-529	25
INDUSTRIAL SOIL (PAHs)	BCR-524	25
INDUSTRIAL SOIL (PCBs )	BCR-481	25
IRON (natural) spike, chloride solution	IRMM-634	83



IRON-57 spike, chloride solution	IRMM-620	83
ISOCTANE (purity)	IRMM-442	72, 74
ISOTOPE RATIOS IN ABSOLUTE ALCOHOL	BCR-656	29, 81
ISOTOPE RATIOS IN ALCOHOLIC SOLUTION	BCR-660	29, 81
ISOTOPE RATIOS IN GLUCOSE	BCR-657	29, 81
LACTATE DEHYDROGENASE ISOENZYME 1 (LD1)	ERM-AD453k/IFCC	63
LAKE SEDIMENT (trace elements)	BCR-280R	14
LAKE SEDIMENT (trace elements)	BCR-701	23
LAMBDA DNA	ERM-AD442k	64
LATEX SPHERES (particle diameter 2 microns)	BCR-165	58
LATEX SPHERES (particle diameter 4.8 microns)	BCR-166	58
LATEX SPHERES (particle diameter 9.6 microns)	BCR-167	58
LEAD GLASS (composition/refractive index)	BCR-126A/B	74
LEAD WITH ADDED IMPURITIES (trace elements)	BCR-288B	75
LEMNA MINOR (aquatic plant)	BCR-670	18
LICHEN (trace elements)	BCR-482	17
LIGHT SANDY SOIL (trace elements)	BCR-142R	13
LIMESTONE POWDERS (for shear testing)	BCR-116	66
LINDE TYPE A ZEOLITE (micropore volume and width)	BCR-705	69
LISTERIA MONOCYTOGENES DNA AGAROSE PLUG	ERM-AD624	53
LITHIUM CARBONATE, isotopic, solid	IRMM-016	82
LITHIUM-6 spike, chloride solution	IRMM-615	83
LOAM SOIL	ERM-CC141	13
LOW VOLATILE STEAM COAL (S)	BCR-331	78
LUNG TISSUE (asbestos fibres)	BCR-665	64
LUNG TISSUE (asbestos fibres)	BCR-666	64
MAGNESIUM (natural) spike, nitrate solution	ERM-AE637	83
MAGNESIUM-26 spike, nitrate solution	ERM-AE638	83
MAIZE	ERM-BC716	44
MAIZE	ERM-BC717	44
MAIZE FLOUR (deoxynivalenol blank)	BCR-377	43
MARGARINE (vitamins)	BCR-122	49
MERCURY (natural) spike, chloride solution	ERM-AE639	83
MERCURY-202 spike, chloride solution	ERM-AE640	84
METHYLMERCURY IN 2 % ETHANOL/WATER SOLUTION	ERM-AE671	84
Mg, isotopic, nitrate solution	IRMM-009	82
MILK POWDER (oxytetracycline)	ERM-BB492	55
MILK POWDER (oxytetracycline) (blank)	ERM-BB493	55
MILK POWDER (PCDDs, PCDFs)	BCR-607	42
MILK POWDER (somatic cell count)	ERM-BD001	52
MIXED VEGETABLES (vitamins)	BCR-485	49
MOROCCAN PHOSPHATE ROCK (trace elements)	BCR-032	71, 79
MULLITE (lattice spacing, other parameters)	BCR-301 (RM)	69
MUSSEL (dc-saxitoxin)	BCR-543	44
MUSSEL TISSUE	BCR-668	19
MUSSEL TISSUE	BCR-682	27
MUSSEL TISSUE (butyltins)	ERM-CE477	24
MUSSEL TISSUE (elements)	ERM-CE278k	18
NATURAL MILK POWDER (PCBs )	BCR-450	41
NATURAL MILK POWDER (pesticides)	BCR-187	42
NATURAL PORK FAT (blank)	ERM-BB444	41
Nb	IRMM-525	74
Nb	IRMM-526	74
n-HEPTANE (purity)	IRMM-441	72, 74

Ni	IRMM-521	74
NIMONIC 75 FOR CREEP TESTING	BCR-425	67
NIMONIC 75 FOR TENSILE PROPERTIES	BCR-661	67
NIVALENOL in acetonitrile	IRMM-316	31
ORGANIC-RICH SOIL (extractable elements)	BCR-700	22
PAHs IN ACETONITRILE / TOLUENE	ERM-AC213	12
PANCREATIC ALPHA AMYLASE	ERM-AD456/IFCC	63
PAPRIKA POWDER (aflatoxin B1, G1)	ERM-BD286	43
PCB STANDARD SOLUTION	BCR-365	5
PEANUT BUTTER (aflatoxins low level)	BCR-385R	43
PEANUT BUTTER (aflatoxins very low level)	BCR-401R	43
Peanut Test Material Kit	IRMM-481	56
PETROL	ERM-EF211	78
PHARMACEUTICAL GLASS	IRMM-435	64
PICENE (purity)	BCR-168	4
PIG KIDNEY (CTC free)	BCR-706	55
PIG KIDNEY (CTC incurred)	BCR-707	55
PIG KIDNEY (trace elements)	ERM-BB186	45
PIG LIVER (CTC free)	BCR-695	55
PIG LIVER (CTC incurred)	BCR-696	55
PIG LIVER (vitamins)	BCR-487	49
PIG MUSCLE (CTC free)	BCR-697	55
PIKE-PERCH (PFASs in fish tissue)	IRMM-427	27
PLANKTON (trace elements)	BCR-414	17
PLASMID DNA FRAGMENTS OF 356043 SOYBEAN	ERM-AD425	36
PLASMID DNA FRAGMENTS OF 98140 MAIZE	ERM-AD427	37
PLASMID DNA FRAGMENTS OF MON 810 MAIZE	ERM-AD413	32
PLASMID DNA FRAGMENTS OF NK603 MAIZE	ERM-AD415	33
PLASTIC FILM (OVERALL MIGRATION IN OLIVE OIL (film A)	BCR-537	51
PLASTIC FILM (OVERALL MIGRATION IN OLIVE OIL (film C)	BCR-539	51
PLATINUM, isotopic, metal	IRMM-010	82
POLYCHLORODIBENZO-P-DIOXINS (PCDD) AND POLYCHLORODIBENZOFURANS (PCDFS)	BCR-614	6
POLYETHYLENE (40, 75, 200, 400 mg/kg Cd)	VDA 001-004	80
POLYETHYLENE (high level)	ERM-EC681m	80
POLYETHYLENE (LDPE)	ERM-EC590	80
POLYETHYLENE (low level)	ERM-EC680m	80
POLYPROPYLENE (PP)	ERM-EC591	80
PORCINE MUSCLE (chloramphenicol blank)	BCR-444	55
PORCINE pDNA CALIBRANT	ERM-AD483	57
PORK FAT (pesticides)	ERM-BB430	42
PORK MUSCLE	ERM-BB124	56
PORK MUSCLE	ERM-BB130	55
PORK MUSCLE	ERM-BB384	47, 50
POTASSIUM CHLORIDE FERTILIZER (elemental composition)	BCR-113	73
POTASSIUM SULPHATE FERTILIZER (elemental composition)	BCR-114	73
PROSTATE SPECIFIC ANTIGEN (protein mass)	BCR-613	61
PURIFIED HUMAN ALFAFOETOPROTEIN (protein mass)	BCR-486	61
PYRENE (purity)	BCR-177R	4
QUARTZ (1.20 – 20.00 microns)	BCR-070	68
QUARTZ (2.50 m <sup>2</sup> /g) (nitrogen BET specific surface area)	BCR-172	69
QUARTZ (particle size 0.35 – 3.50 microns)	BCR-066	68
QUARTZ (particle size 14 – 90 microns)	BCR-069	68
QUARTZ (particle size 1400 – 5000 microns)	BCR-132	68
QUARTZ (particle size 160 – 630 microns)	BCR-068	68
QUARTZ (particle size 2.40 – 32.00 microns)	BCR-067	68

QUARTZ (particle size 480 – 1800 microns)	BCR-131	68
QUARTZ (particle size 50 – 220 microns)	BCR-130	68
RAPESEED (colza) (S, total glucosinolate, high level)	ERM-BC367	43
RAPESEED (colza) (S, total glucosinolate, low level)	ERM-BC366	43
RAPESEED (colza) (S, total glucosinolate, medium level)	ERM-BC190	43
RESIN-BONDED FIBRE BOARD (thermal conductivity)	IRMM-440	65
Rh	IRMM-529	74
RICE (As species)	ERM-BC211	24
RICE FLOUR	IRMM-804	45
RICE FLOUR (amylose, high level)	BCR-467	49
RICE FLOUR (amylose, low level)	BCR-465	49
RICE FLOUR (amylose, medium level)	BCR-466	49
RIVER SEDIMENT (extractable phosphorous)	BCR-684	22
ROAD DUST (trace elements)	BCR-723	15
RUBIDIUM (natural) spike, nitrate solution	IRMM-619	83
RUBIDIUM-87 spike, nitrate solution	IRMM-618	83
RUMINANT pDNA CALIBRANT	ERM-AD482	56
RYE FLOUR	ERM-BC381	47, 50
RYE GRASS	ERM-CD281	16
SALMON TISSUE	BCR-725	55
SALMONELLA ENTERITIDIS (NCTC 12694)	IRMM-352	53
SAXITOXIN IN ACETIC ACID	BCR-663	30
SCRATCH TESTING	BCR-692	67
SEAWATER	ERM-CA403	21
SEAWATER (Hg)	ERM-CA400	21
SEWAGE SLUDGE	ERM-CC144	13
SEWAGE SLUDGE (industrial origin) (trace elements)	BCR-146R	14
SEWAGE SLUDGE (mixed origin) (trace elements)	BCR-145R	14
SEWAGE SLUDGE (PCDDs and PCDFs)	BCR-677	26
SEWAGE SLUDGE AMENDED (terra rossa) SOIL (trace elements)	BCR-484	22
SEWAGE SLUDGE AMENDED SOIL (trace elements)	BCR-143R	13
SEWAGE SLUDGE AMENDED SOIL (trace elements)	BCR-483	22
SILICON DIOXIDE, isotopic, solid	IRMM-018a	82
SIMULATED RAINWATER (major components)	ERM-CA408	20
SINGLE CELL PROTEIN (major elements)	BCR-273	46
SINGLE CELL PROTEIN (trace elements)	BCR-274	46
SKIM MILK POWDER	BCR-685	50
SKIMMED MILK POWDER (trace elements)	ERM-BD150	45
SKIMMED MILK POWDER (trace elements)	ERM-BD151	45
SOYA BEAN	ERM-BC700	45
SOYA-MAIZE OIL BLEND (fatty acid profile)	BCR-162R	48
SPIKED MILK POWDER (pesticides)	BCR-188	42
SPIKED PORK FAT (low level)	ERM-BB446	41
SPIKED PORK FAT (very low level)	ERM-BB445	41
SULPHUR-32 spike, nitrate solution	IRMM-643	84
SULPHUR-32 spike, nitrate solution	IRMM-644	84
SULPHUR-32 spike, nitrate solution	IRMM-645	84
SULPHUR-34 spike, nitrate solution	IRMM-646	84
SURFACE WATER	ERM-CA100	28
SUSPENSION OF TiO2 NANORODS	ERM-FD103	71
TANTALUM PENTOXIDE ON TANTALUM FOIL	BCR-261T	69
TETRAMETHYLUREA	STA-003m	29
THALLIUM (natural) spike, nitrate solution	ERM-AE649	84
THERMALLY REFINED LEAD (trace elements)	BCR-287A, B	75
THROMBOPLASTIN RABBIT (prothrombin time)	ERM-AD149	64

THYROXINE (T4)	IRMM-468	58
Ti	IRMM-531	74
Ti 6AL 4V ALLOY (O)	BCR-059A, B	75
TiAl6V4 (Al, V)	BCR-089	76
TIN ORE CONCENTRATE (Sn)	BCR-010	73
TITANIA (8.23 m <sup>2</sup> /g) (nitrogen BET specific surface area)	BCR-173	69
TITANIUM (H)	BCR-318	75
TITANIUM (impurities)	ERM-EB090a,b	77
TITANIUM (impurities)	BCR-090A, B	77
TITANIUM (O, N)	BCR-024B, C	75
TOASTED BREAD	ERM-BD273	57
TRACE ELEMENTS IN WHITE CABBAGE	BCR-679	46
TRIPHENYLENE (purity)	BCR-270	4
TROUT MUSCLE	ERM-CE101	18, 47
TUNA FISH (total and methylmercury)	ERM-CE464	19, 24
TUNA FISH TISSUE (As species)	BCR-627	24
TUNGSTEN (0.18 m <sup>2</sup> /g) (nitrogen BET specific surface area)	BCR-175	69
TUNGSTEN CARBIDE POWDER (O)	BCR-102	75
UNALLOYED ZINC (disc) (trace elements)	BCR-326	75
UNALLOYED ZINC (disc) (trace elements)	BCR-327	75
UNALLOYED ZINC (trace elements)	ERM-EB322	75
UNALLOYED ZINC (trace elements)	ERM-EB323	75
UNALLOYED ZINC (trace elements)	ERM-EB324	75
UNALLOYED ZINC (trace elements)	ERM-EB325	75
UNALLOYED ZINC (trace elements)	BCR-321	75
UREA FERTILIZER (composition)	BCR-179	73
WASTE MINERAL OIL (high PCB level)	BCR-449	27
WASTE MINERAL OIL (low PCB level)	BCR-420	27
WASTE WATER	ERM-CA713	21
WATER (PFASs in water)	IRMM-428	27
WELDING DUST LOADED ON FILTER (Cr VI, Cr)	BCR-545	24
WHEAT (ochratoxin A, blank)	BCR-471	44
WHEAT FLOUR	ERM-BC382	47, 50
WHEAT FLOUR (deoxynivalenol blank)	BCR-396	43
WHITE CLOVER (trace elements)	BCR-402	16
WHOLE MILK POWDER (aflatoxin M1, high level)	ERM-BD284	43
WHOLE MILK POWDER (aflatoxin M1, low level)	ERM-BD283	43
WHOLE MILK POWDER (aflatoxin M1, zero level)	ERM-BD282	43
WHOLE MILK POWDER (vitamins)	ERM-BD600	49
WHOLEMEAL FLOUR (vitamins)	BCR-121	49
WILD BERRIES	IRMM-426	57
WINE (EtOH, low level)	BCR-653	49
ZEARALENONE IN ACETONITRILE	ERM-AC699	30
ZINC ORE CONCENTRATE (trace elements)	BCR-109	79
ZINC ORE CONCENTRATE (trace elements)	BCR-110	79
ZINC-64 spike, nitrate solution	IRMM-3702	84
ZINC-64 spike, nitrate solution	IRMM-651	84
ZINC-64 spike, nitrate solution	IRMM-652	84
Zinc-64, nitrate solution	IRMM-007/1-6	82
ZINC-67 spike, nitrate solution	IRMM-653	84
ZINC-68 spike, nitrate solution	IRMM-654	84
ZIRCALOY (C, N, O)	BCR-275	75
ZIRCALOY (C, N, O)	BCR-276	75
ZIRCALOY-4 (trace element impurities)	BCR-098	77
ZnAl4 (trace elements)	BCR-351	76

ZnAl4 (trace elements)	BCR-352	76
ZnAl4 (trace elements)	BCR-353	76
ZnAl4 (trace elements)	BCR-354	76
ZnAl4 (trace elements)	BCR-355	76
ZnAl4Cu1 (trace elements)	BCR-356	76
ZnAl4Cu1 (trace elements)	BCR-357	76
ZnAl4Cu1 (trace elements)	BCR-360	76
ZnAl4Cu1 (trace elements)	BCR-361	76

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