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**Joint Research Centre**

**IRMM**

**CERTIFIED REFERENCE MATERIALS**  
**2010**

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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 Institute for Reference Materials and Measurements (IRMM) provides

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**<http://irmm.jrc.ec.europa.eu>**

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# 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[jj]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[ghij]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 30.998
<b>BCR-082R</b>	6-METHYLCHRYSENE (unit size 10 mg)	2 ±	0.001 3
<b>BCR-091</b>	ANTHRANTHRENE	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[ghij]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	0.992 8	+ 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.

	<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>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-338</b>	4H-CYCLOPENTA[def]PHENANTHREN-4-ONE	0.995 1	± 0.003 0
<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>			
<b>BCR-289</b>	IUPAC No. 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>	Uncertainty expressed in concentration units <sup>3)</sup>
	(µg/kg)	(µg/kg)		
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>	Uncertainty expressed in concentration units <sup>3)</sup>
	(µg/kg)	(µg/kg)		
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)		
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	0.15
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)		
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)		
<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.

## 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)		
As				9.9	±	1.5			
Cd	0.34	±	0.04	0.35	±	0.05	71.8	±	1.2
Co	12.1	±	0.7	8.5	±	0.5	12.3	±	0.3
Cr				86	±	8			
Cu	69.7	±	1.3	14.4	±	1.4	130.6	±	1.5
Hg	0.067	±	0.011				1.10	±	0.07
Mn	970	±	16	464	±	18	904	±	13
Ni	64.5	±	2.5	26.4	±	2.4	299	±	5
Pb	40.2	±	1.9	41	±	4	179.7	±	2.1
Zn	(101	±	6)	57	±	4	1055	±	14
Aqua regia soluble <sup>1)</sup>									
As				7.5	±	1.4			
Cd	0.249	±	0.010	0.25	±	0.04	72.0	±	1.8
Co	(10.2	±	0.6)	7.9	±	0.9	(11.8	±	1.0)
Cr				31	±	4	426	±	12
Cu	(69.8	±	1.0)	12.4	±	0.9	(128	±	7)
Hg							(1.10	±	0.06)
Mn	(800	±	50)	387	±	17	858	±	11
Ni	61.1	±	1.5	21.9	±	1.6	296	±	4
Pb	25.7	±	1.6	32.2	±	1.4	174	±	5
Zn	93.3	±	2.7	50	±	4	1063	±	16

Values in brackets are not certified.

Availability: Glass bottles containing about 50 g of powdered material; ERM-CC141 contains minimum 24 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)		BCR-597 Sewage sludge (mg/kg)			
Cd	3.50	± 0.15	18.8	± 0.5	203	± 6		
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 and BCR-597.

<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	BCR-038 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.

### Fly ash on artificial filters - BCR-128

The material consists of a methyl cellulose foil mounted on polythene backed paper in a petrislide (diameter 4.7 cm) of standard size to fit common XRF- and PIXE-equipment. Each foil with a thickness of 10 - 15 µm contains a certified amount of BCR-038 ("fly ash") with particle size smaller than 10 µm. The surface density is in the range: 250 - 275 µg/cm<sup>2</sup>. Each sample is certified individually. Each unit consists of one blank and one fly ash charged foil.

Substance	Uncertainty (%)	Substance	Uncertainty (%)
As	5.7	Mn	4.5
Co	4.6	Na	5.0
Cu	5.9	Pb	5.2
Fe	3.7	Zn	5.8

Substance	BCR-176R 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	BCR-723 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	BCR-060 Lagarosiphon major (Aquatic plant) (mg/kg)			BCR-596 Trapa natans (Aquatic plant) (mg/kg)		
	Al	4180	±	120	36.3	±
Cd	2.20	±	0.10			
Cr						
Cu	51.2	±	1.9			
Hg	0.34	±	0.04			
Mn	1760	±	60			
Pb	64	±	4			
Zn	313	±	8			

Availability: CRMs are provided in units of 25 g.

Substance	BCR-100 Beech leaves (g/kg)		
Al	0.435	±	0.004
Ca	5.30	±	0.05
Cl	1.49	±	0.06
Cr	0.008 0	±	0.000 6
K	9.94	±	0.20
Mg	0.878	±	0.017
N	26.29	±	0.25
P	1.55	±	0.04
S	2.69	±	0.04

Availability: BCR-100 is provided in units of 30 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)
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	<b>BCR-279</b> Ulva lactuca (Sea lettuce) (mg/kg)		<b>BCR-482</b> Lichen (mg/kg)	
	Al	3.09	± 0.20	1103
As		(27 × 10 <sup>3</sup> )	0.85	± 0.07
Ca	0.274	± 0.022	0.56	± 0.02
Cd		(25 × 10 <sup>3</sup> )		
Cl		(10.7)	4.12	± 0.15
Cr	13.14	± 0.37	7.03	± 0.19
Cu		(2.4 × 10 <sup>3</sup> )		
Fe		(0.05)	0.48	± 0.02
Hg		(154)		
I		(13 × 10 <sup>3</sup> )		
K		(14 × 10 <sup>3</sup> )		
Mg		(2.09 × 10 <sup>3</sup> )		
Mn		(20.8 × 10 <sup>3</sup> )		
N		(1.80 × 10 <sup>3</sup> )	2.47	± 0.07
P				
Pb	13.48	± 0.36	40.9	± 1.4
Se	0.593	± 0.032		
Zn	51.3	± 1.2	100.6	± 2.2

Values in brackets are not certified.

Availability: CRMs are provided in powder form in bottles containing approximately for BCR-279 35 g, BCR-482 15 g.

Substance	<b>BCR-670</b> Lemna minor (Aquatic plant) (duck weed) (µg/kg)		
	As	(1980	±
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		<b>BCR-063R</b> Skim milk powder (natural)		
Ca	g/kg	13.49	±	0.10
Cl	g/kg	9.94	±	0.30
Cu	mg/kg	0.602	±	0.019
Fe	mg/kg	2.32	±	0.23
I	mg/kg	0.81	±	0.05
K	g/kg	17.68	±	0.19
Mg	g/kg	1.263	±	0.024
N (total)	g/kg	62.3	±	0.8
Na	g/kg	4.37	±	0.031
P	g/kg	11.10	±	0.13
Pb	µg/kg	18.5	±	2.7
Zn	mg/kg	49.0	±	0.6

Availability: Glass bottles containing 50 g of powdered material.

Substance		<b>ERM-CE278</b> Mussel tissue (mg/kg)		
As		6.07	±	0.13
Cd		0.348	±	0.007
Cr		0.78	±	0.06
Cu		9.45	±	0.13
Hg		0.196	±	0.009
Mn		7.69	±	0.23
Pb		2.00	±	0.04
Se		1.84	±	0.10
Zn		83.1	±	1.7

Availability: CRMs are provided in powder form in bottles containing approximately 8 g.

Substance		<b>BCR-668</b> 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	<b>BCR-463</b> Tuna fish (mg/kg)			<b>ERM-CE464</b> Tuna fish (mg/kg)		
	Total Hg	2.85	±	0.16	5.24	±
CH <sub>3</sub> Hg <sup>+</sup>	3.04	±	0.16	5.50	±	0.17

Availability: Glass bottles containing about 15 g.

Substance	<b>BCR-505</b> Trace elements in estuarine water (nmol/kg)			<b>BCR-579</b> Coastal sea-water (ng/kg)		
	Cd	0.80	±	0.04	1.9	±
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>BCR-409</b> Simulated rain-water (high contents) (μmol/kg)		
	<b>Mass concentration:</b>					
Ammonium	0.910	±	0.028	15.5	±	0.3
Ca		±	0.07			
Cl	1.96	±	0.07			
Fluoride	0.194	±	0.008			
H <sub>3</sub> O						
K						
Mg	0.145	±	0.022			
Na						
NH <sub>4</sub>						
NO <sub>3</sub>						
<i>Ortho</i> -phosphate	2.01	±	0.09	48.0	±	2.1
SO <sub>4</sub>	1.00	±	0.05	4.25	±	0.21
	1.46	±	0.04	12.3	±	0.2
				82.9	±	1.2
				106	±	2
				78.1	±	1.0
				53.2	±	0.7
<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; BCR-409 is provided in units of about 100 mL in sealed quartz ampoules.

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

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

Substance	<b>BCR-609</b> Ground water (low contents) (µg/kg)	<b>BCR-610</b> Ground water (high contents) (µg/kg)	<b>ERM-CA616</b> Ground water (high carbonate content) (mg/L)	<b>BCR-617</b> Ground water (low carbonate content) (mg/kg)	
Al	47.7 ± 1.6	159 ± 4	<b>Mass concentration:</b>  42.6 ± 1.4 44.6 ± 10.9 5.79 ± 0.15 10.1 ± 0.3  27.9 ± 0.8  2.24 ± 0.10  <b>Electrochemical property:</b> 426 ± 5 µS/cm 7.12 ± 0.18		
As	1.20 ± 0.12	10.8 ± 0.4			
Cd	0.164 ± 0.012	2.94 ± 0.08			
Cu	2.48 ± 0.09	45.7 ± 1.5			
Pb	1.63 ± 0.04	7.78 ± 0.13			
Ca					14.6 ± 0.4
Cl					26.4 ± 0.4
K					9.93 ± 0.26
Mg					7.32 ± 0.15
Mn					0.050 ± 0.002
Na					14.6 ± 0.3
NO <sub>3</sub>					25.8 ± 0.5
<i>Ortho</i> -phosphate					
PO <sub>4</sub>					26.3 ± 0.5
SO <sub>4</sub>					
Conductivity (20 °C)					
pH (20 °C)					

Availability: BCR-609 and BCR-610 are provided in 500 mL PE bottles; ERM-CA616 consists of about 95 mL natural groundwater in a flame-sealed ampoule; BCR-617 is provided in 75 mL glass ampoules.

Substance	<b>ERM-CA615</b> 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	<b>BCR-713</b> Wastewater (effluent)			
As	9.7	±	1.1	µg/L
Cd	5.1	±	0.6	µg/L
Cr	21.9	±	2.4	µg/L
Cu	69	±	4	µg/L
Fe	0.40	±	0.04	mg/L
Mn	43.4	±	3.0	µg/L
Ni	30	±	5	µg/L
Pb	47	±	4	µg/L
Se	5.6	±	1.0	µg/L

Availability: 120 mL ampoule containing 100 mL of wastewater reference materials acidified with HNO<sub>3</sub> in Pyrex ampoules, sealed under argon.

## 1.2.2 CERTIFIED FOR THE EXTRACTABLE ELEMENT CONTENT AND SPECIES

Substance	<b>BCR-483</b> Sewage sludge amended soil (mg/kg)		<b>BCR-484</b> Sewage sludge amended (terra rossa) soil (mg/kg)		<b>BCR-700</b> 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)		

Values in brackets are not certified.

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	<b>BCR-684</b> 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	7.34	±	0.35
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	55.2	±	4.0
Ni	15.3	±	0.9
Pb	9.3	±	2.0
Zn	45.7	±	4.0
	<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	±	80
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.

Substance	<b>BCR-605</b> Urban dust (µg/kg)		
Trimethyllead (TriML)	7.9	±	1.2

Availability: Glass bottles containing about 15 g of 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>BCR-463</b> Tuna fish (mg/kg)		<b>ERM-CE464</b> Tuna fish (mg/kg)	
Total Hg	2.85	± 0.16	5.24	± 0.10
CH <sub>3</sub> Hg <sup>+</sup>	3.04	± 0.16	5.50	± 0.17

Availability: Glass bottles containing about 15 g powder.

Substance	<b>BCR-627</b> Tuna fish tissue			
Arsenobetaine	52	±	3	µmol/kg
Dimethylarsinic acid	2.0	±	0.3	µmol/kg
Total As	4.8	±	0.3	mg/kg

Availability: Glass bottles containing about 10 g powder.

### 1.2.3 CERTIFIED FOR ORGANIC POLLUTANTS

Substance	<b>BCR-524</b> Contaminated industrial soil (mg/kg)		
Pyrene	173	±	11
benz[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
Benz[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			BCR-536		
	Industrial soil (mg/kg)			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			BCR-530		
	Industrial (sandy) soil			Industrial (clay) soil		
1,2,3 - trichlorobenzene	0.63	± 0.11	mg/kg	15	± 4	mg/kg
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	<b>BCR-677</b> 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	<b>BCR-490</b> 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	<b>BCR-615</b> 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	<b>BCR-683</b> 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.)	<b>BCR-682</b> Mussel tissue (µg/kg)	<b>BCR-718</b> Canned fresh herring (µg/kg)	<b>BCR-719</b> Canned fresh chub (ng/kg)
28	0.30 ± 0.07	0.41 ± 0.04	
52	0.78 ± 0.09	1.00 ± 0.04	
77			196 ± 6
81			13.6 ± 0.4
101		2.12 ± 0.06	
105		0.63 ± 0.06	
118	2.6 ± 0.3	1.78 ± 0.07	
126			20.0 ± 0.8
128		0.62 ± 0.101	
138	4.6 ± 0.8	2.97 ± 0.11	
138 + 163			
149	5.7 ± 0.9	2.58 ± 0.11	
153	9.2 ± 0.8	4.62 ± 0.10	
156		0.19 ± 0.09	
169			1.80 ± 0.15
170	0.17 ± 0.05	0.350 ± 0.026	
180	0.77 ± 0.07	0.795 ± 0.027	

Availability: BCR-682, BCR-718 and BCR-719 are provided in sealed tin cans containing approximately 70 g fresh mussel tissue.

	<b>BCR-112</b> Mass of sorbed aromatic hydrocarbon on Tenax per charged tube (µg)
Benzene	1.053 ± 0.014
Toluene	1.125 ± 0.015
m-Xylene	1.043 ± 0.015

Availability: Consists of one stainless steel sampling tube (89 mm length; 6.34 mm outer diameter, closed with Swagelock caps with Teflon ferrules) containing 100 mg of charged Tenax.

Polychlorinated biphenyls (IUPAC No.)	<b>BCR-420</b> Waste mineral oil (low level) (mg/kg)	<b>BCR-449</b> 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.

## 1.2.4 OTHERS

Parameter	IRMM443-1 (EUROSOIL 1)	IRMM443-2 (EUROSOIL 2)	IRMM443-3 (EUROSOIL 3)
K <sub>f</sub> of atrazine <sup>(1)</sup>	7.0 ± 1.5	2.7 ± 0.7	2.4± 0.7
1/n of atrazine <sup>(1)</sup>	0.91 ± 0.11	0.93 ± 0.12	0.91± 0.13
K <sub>f</sub> of 2,4-D <sup>(1)</sup>	2.5 ± 1.0	0.99 ± 0.30	1.31± 0.28
1/n of 2,4-D <sup>(1)</sup>	0.9 ± 0.4	0.96 ± 0.15	0.93± 0.15
K <sub>f</sub> of lindane <sup>(1)</sup>		48 ± 11	
1/n of lindane <sup>(1)</sup>		0.98 ± 0.15	
pH in water <sup>(2)</sup>	6.21 ± 0.30	8.1 ± 0.9	6.2± 0.4
pH in 0.01M CaCl <sub>2</sub> <sup>(2)</sup>	5.65 ± 0.24	7.5 ± 0.8	5.5± 0.4

Parameter	IRMM443-4 (EUROSOIL 4)	IRMM443-5 (EUROSOIL 5)	IRMM443-7 (EUROSOIL 7)
K <sub>f</sub> of atrazine <sup>(1)</sup>	0.7 ± 0.4	13 ± 6	4.8± 1.1
1/n of atrazine <sup>(1)</sup>	0.87 ± 0.22	0.9 ± 0.4	0.92± 0.15
K <sub>f</sub> of 2,4-D <sup>(1)</sup>	0.39 ± 0.21	18 ± 7	8.2± 1.8
1/n of 2,4-D <sup>(1)</sup>	0.86 ± 0.4	0.9 ± 0.4	0.88± 0.15
K <sub>f</sub> of lindane <sup>(1)</sup>	8.3 ± 2.2		
1/n of lindane <sup>(1)</sup>	0.96 ± 0.12		
pH in water <sup>(2)</sup>	7.5 ± 0.7	4.1 ± 1.5	5.1± 0.8
pH in 0.01M CaCl <sub>2</sub> <sup>(2)</sup>	6.8 ± 0.6	3.1 ± 1.1	4.3± 0.7

(1) Determination according OECD Testguideline 106.

(2) Measurement based on ISO Standard 10390.

Uncertainty express as estimated expanded uncertainty as defined in the Guide to the Expression of Uncertainty in Measurement (GUM).

Availability: Brown glass bottles with 200 g of air-dried fine soil (< 2 mm).

## 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>VPDB</sub> by IRMS	‰	-26.91	± 0.07
Alcoholic grade t <sub>D</sub>	w/w %	94.61	± 0.05

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

Parameter	Unit	BCR-657 (Sugar)	BCR-658 (Synthetic wine)	BCR-659 (Synthetic wine)	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
δ <sup>18</sup> O <sub>VSMOW</sub> of water from wine by IRMS	‰		-7.19 ± 0.04	-7.18 ± 0.02	
(D/H) <sub>w</sub> of water (IRMS)	ppm				148.68 ± 0.14
Alcoholic grade t <sub>D</sub>	w/w %				11.96 ± 0.06 <sup>1)</sup>

1) in v/v %

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

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

BCR-658: Units of 25 mL of synthetic wine solution in glass bottle;

BCR-659: Units of 25 mL of synthetic wine solution in glass bottle;

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

### Tetramethylurea (STA-003k)

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 76.7, 61.4 and 45.05 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	BCR-663 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	ERM-AC699 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	
Aflatoxin B1	<u>Mass fraction</u> (µg/g) 3.79 ± 0.11	<u>Mass concentration at 20 °C</u> (µg/mL) (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	
Aflatoxin B2	<u>Mass fraction</u> (µg/g) 3.80 ± 0.08	<u>Mass concentration at 20 °C</u> (µg/mL) (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	
Aflatoxin G1	<u>Mass fraction</u> (µg/g) 3.78 ± 0.13	<u>Mass concentration at 20 °C</u> (µg/mL) (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	
Aflatoxin G2	<u>Mass fraction</u> (µg/g) 3.80 ± 0.07	<u>Mass concentration at 20 °C</u> (µg/mL) (2.98 ± 0.06)

Values in brackets are not certified.

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

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

Values in brackets are not certified.

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

Substance	<b>IRMM-316</b> Nivalenol in acetonitrile	
Nivalenol	<u>Mass fraction</u> (µg/g) 24.0 ± 1.1	<u>Mass concentration</u> (µg/mL) (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 Roundup Ready™ soya beans (ERM-BF410)

Six CRMs of dried soya bean powder with different mass fractions of genetically modified (Roundup Ready™) soya beans were produced by IRMM.

	Certified value Roundup Ready mass fraction (g/kg)	Uncertainty (g/kg)
ERM-BF410a	< 0.3	-
ERM-BF410b	1.0	0.5
ERM-BF410c	5.0	1.0
ERM-BF410dk	10.0	1.0
ERM-BF410e	20.0	2.6
ERM-BF410gk	100	7

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 by IRMM.

	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-BF412)

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

	Certified value Bt-11 mass fraction (g/kg)	Uncertainty (g/kg)
ERM-BF412a	< 0.12	-
ERM-BF412b	0.98	0.29
ERM-BF412c	4.9	0.6
ERM-BF412d	9.8	0.9
ERM-BF412e	19.6	1.3
ERM-BF412f	48.9	2.1

Availability: Vials containing about 1 g of maize powder.

### CRMs for genetically modified MON 810 maize (ERM-BF413)

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

	Certified value MON 810 mass fraction (g/kg)	Uncertainty (g/kg)
ERM-BF413a	< 0.2	-
ERM-BF413b	1.00	0.26
ERM-BF413c	5.0	0.4
ERM-BF413d *	10.0	0.5
ERM-BF413e	20.0	0.6
ERM-BF413f	50.0	1.1

Availability: Vials containing about 1 g of maize powder.

\* ERM-BF413d is also certified for the DNA copy number ratio.

	Certified value MON 810 DNA copy number ratio (%)	Uncertainty (%)
ERM-BF413d	0.57	0.17

Substance	ERM-AD413 Plasmid DNA containing MON 810 maize DNA fragments		
	<u>Number</u>		
Fragment of <i>5' plant-P35S</i> junction DNA/plasmid	1	±	negligible
Fragment of <i>hmg</i> DNA/plasmid	1	±	negligible
	<u>Number ratio</u>		
Ratio between the number of <i>5' plant-P35S</i> junction and <i>hmg</i> fragments in the plasmid	(1.00)	±	0.06)
	(1.04)	±	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 by IRMM.

	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 by IRMM.

	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.

### 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 by IRMM.

	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 by IRMM.

	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 by IRMM.

	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 by IRMM.

	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 by IRMM.

	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 by IRMM.

	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 by IRMM.

	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 by IRMM.

	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 by IRMM.

	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 by IRMM.

	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.

### 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 by IRMM.

	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 by IRMM.

	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.

### 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 by IRMM.

	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 by IRMM.

	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.

## 2.2.2 CERTIFIED FOR NATURAL TOXINS AND XENOBIOTICS

Substance	BCR-458 Coconut oil (µg/kg)	BCR-459 Coconut oil (µg/kg)
Pyrene	9.4 ± 1.5	< 0.9
Chrysene	4.9 ± 0.4	< 0.6
Benzo[k]fluoranthene	1.87 ± 0.18	< 0.2
Benzo[a]pyrene	0.93 ± 0.09	< 0.3
Benzo[ghi]perylene	0.97 ± 0.07	< 0.2
Indeno[1,2,3-cd]pyrene	1.00 ± 0.07	< 0.2

Availability: BCR-458 and BCR-459 are 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		(3.7)	(3.9)	(6.1)
γ-HCH (lindane)		(5.7)	(5.6)	(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	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
o,p'-DDT	0.046	±	0.005
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 Milk powder (µg/kg)		BCR-188 Milk powder (spiked) (µg/kg)	
HCB	1.45	± 0.21	37.4	± 2.7
α-HCH	1.80	± 0.14		
β-HCH			12.0	± 1.2
γ-HCH	5.7	± 0.8	45.4	± 2.9
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

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

Substance	BCR-430 Pork fat (mg/kg)		
HCB	0.392	±	0.026
α-HCH	0.140	±	0.013
β-HCH	0.259	±	0.021
γ-HCH	0.499	±	0.031
β-HEPO	0.109	±	0.009
p,p'-DDE	0.82	±	0.06
Dieldrin	0.124	±	0.011
Endrin	0.020	±	0.004
p,p'-DDT	3.40	±	0.19
p,p'-TDE			(0.77)

Value in brackets is not certified.

Availability: The samples are provided in ampoules containing about 3 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>	
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			0.4 ± 0.1	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.

	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-401R</b> Peanut butter (very low level)	<b>BCR-385R</b> Peanut butter (low level)
	<u>Mass fraction</u> (µg/kg)	<u>Mass fraction</u> (µg/kg)
Aflatoxin B1	< 0.2	1.77 ± 0.30
Aflatoxin B2	< 0.2	0.48 ± 0.08
Aflatoxin G1	< 0.2	0.9 ± 0.4
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.

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
ZON	<u>Mass fraction</u> (µg/kg) < 5	<u>Mass fraction</u> (µg/kg) 83 ± 9

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

### 2.2.3 CERTIFIED FOR THE TOTAL ELEMENT CONTENT

Substance	<b>BCR-150</b> Skim milk powder (spiked)	<b>BCR-151</b> Skim milk powder (spiked)
Cd ng/g	21.8 ± 1.4	101.0 ± 8.0
Cu µg/g	2.23 ± 0.08	5.23 ± 0.08
Fe µg/g	11.8 ± 0.6	50.1 ± 1.3
Hg ng/g	9.4 ± 1.7	101 ± 10
I µg/g	1.29 ± 0.09	5.35 ± 0.14
Pb µg/g	1000 ± 40	2002 ± 26

Availability: Glass bottles containing 23 g of powdered material.

Substance	<b>BCR-185R</b> Bovine liver
As µg/kg	33.0 ± 2.9
Cd µg/kg	544 ± 17
Cu mg/kg	277 ± 5
Mn µg/kg	11.07 ± 0.29
Pb µg/kg	172 ± 9
Se µg/kg	1680 ± 140
Zn mg/kg	138.6 ± 2.1

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

Substance		<b>BCR-191</b> 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		<b>IRMM-804</b> 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	<b>BCR-273</b> Single cell protein (mg/g)			<b>BCR-274</b> Single cell protein (µg/g)		
	As				0.132	±
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		<b>BCR-679</b> 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

## 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
<b>Sterols</b>	<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.

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

<sup>2)</sup> 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	<b>BCR-633</b>		
	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
<i>n</i> -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	<b>IRMM-801</b>		
	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.

Component	<b>BCR-519</b>		
	Anhydrous butter fat (%)		
Cholesterol	0.30	±	0.03
C24	0.05	±	0.02
C26	0.25	±	0.03
C28	0.59	±	0.04
C30	1.15	±	0.05
C32	2.43	±	0.12
C34	5.64	±	0.18
C36	10.47	±	0.19
C38	12.53	±	0.22
C40	10.03	±	0.16
C42	6.69	±	0.10
C44	6.11	±	0.08
C46	6.86	±	0.08
C48	8.69	±	0.15
C50	11.40	±	0.24
C52	10.96	±	0.25
C54	5.89	±	0.13

Availability: The material consists of anhydrous butter fat and is supplied in units of two glass ampoules sealed under nitrogen, each containing approximately 5 mL fat. At normal ambient temperature BCR-519 is solid.

	<b>BCR-632</b> Butter fat					
Compound	<b>BCR-632A</b> Pure butter fat (g/100 g)			<b>BCR-632B</b> Adulterated butter fat (g/100 g)		
C24	0.07	±	0.04	0.08	±	0.04
Cholesterol	0.289	±	0.012	0.278	±	0.011
C26	0.33	±	0.06	0.34	±	0.06
C28	0.74	±	0.07	0.75	±	0.06
C30	1.37	±	0.08	1.46	±	0.07
C32	2.83	±	0.14	3.30	±	0.12
C34	6.09	±	0.29	6.57	±	0.25
C36	10.7	±	0.5	11.1	±	0.4
C38	12.5	±	0.4	12.7	±	0.4
C40	10.05	±	0.19	10.07	±	0.17
C42	7.07	±	0.13	7.10	±	0.10
C44	6.68	±	0.12	6.57	±	0.12
C46	7.36	±	0.17	7.12	±	0.17
C48	8.74	±	0.21	8.42	±	0.19
C50	10.74	±	0.24	10.28	±	0.19
C52	9.8	±	0.4	9.36	±	0.28
C54	4.7	±	0.5	4.5	±	0.4

Availability: BCR-632 is available as a set of BCR-632A and BCR-632B: 2 amber glass ampoules each with approximately 5 mL.

	<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 <sub>1</sub> (thiamin)	4.63 ± 0.39			3.07 ± 0.34	8.6 ± 1.1
B <sub>2</sub> (riboflavin)					106.8 ± 5.6
B <sub>6</sub> (total pyridoxine)	4.10 ± 1.02			4.8 ± 0.8	19.3 ± 2.9
B <sub>12</sub>					1.12 ± 0.09
C (total ascorbate)			4830 ± 240		
D <sub>3</sub> (cholecalciferol)		0.125 ± 0.007			
E (tocopherol)		241 ± 12			
Folate (total)	0.50 ± 0.07			3.15 ± 0.28	13.3 ± 1.3
Niacin			43 ± 3		
Trans- $\alpha$ -carotene				10.5 ± 0.6	
Trans- $\beta$ -carotene				23.7 ± 1.5	
Total- $\alpha$ -carotene				9.8 ± 0.7	
Total- $\beta$ -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.

	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	BCR-644 Artificial foodstuff			BCR-645 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.

	BCR-651 Beer (% ethanol v/v)		BCR-652 Beer (% ethanol v/v)		BCR-653 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-380R Whole milk powder (g / 100 g)			BCR-685 Skim milk powder (g / 100 g)		
<u>Mass fraction</u>						
Crude protein (Kjeldahl-N x 6.38)	28.66	±	0.28	38.2	±	0.4
Fat	26.95	±	0.16	0.96	±	0.12
Lactose (anhydrous)	37.1	±	1.0			
Ash	6.00	±	0.13			

Availability: BCR-380R is supplied in units of about 100 g, BCR-685 in units of about 50 g, in amber glass bottles.

Quantity	BCR-446 Low oil content rapeseed		BCR-447 Medium oil content rapeseed		BCR-448 High oil content rapeseed	
<u>Mass fraction (g/100 g)</u>						
'As is' Oil	39.49	± 0.15	41.99	± 0.15	45.43	± 0.19
Moisture and volatiles	7.01	± 0.07	7.42	± 0.07	7.68	± 0.08
'Dry basis' Oil	42.48	± 0.15	45.36	± 0.15	49.21	± 0.20

Availability: About 150 g of rapeseed in a specially laminated bag containing an oxygen absorber and sealed under dry argon.

Substance	BCR-708 Dairy feed			BCR-709 Pig feed			
<b>Mass fraction</b>							
Crude protein	240	±	12	199	±	5	g/kg
Crude oils and fats	65	±	8	51	±	14	g/kg
Crude fibre	93	±	14	56	±	12	g/kg
Crude ash	50.0	±	3.0	42	±	4	g/kg
Ca	4.8	±	0.5	1.05	±	0.16	g/kg
Cu	37	±	4	173	±	25	mg/kg
Mg	1.47	±	0.22	1.89	±	0.30	g/kg
P	4.7	±	0.4	5.4	±	0.7	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)	
<b>Dietary Fibres</b>										
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.

	BCR-537 Plastic film A (mg/dm <sup>2</sup> )		BCR-538 Plastic film B (mg/dm <sup>2</sup> )		BCR-539 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		5.7 ± 0.7		6.1 ± 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						

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, (125 x 22.5) cm for BCR-538 and (45 x 25) cm for BCR-539.

Substance	BCR-593 Plastic film E			
Fat-soluble fluorescent additive (1,4-diphenyl-1,3-butadiene)	12.6	±	0.7	mg/kg
Film thickness	149.7	±	0.7	µm

Availability: Lay-flat tube in units of approximate dimensions (120 x 20) cm sufficient for one complete test as specified in the European pre-standard ENV 1186-\*\*.

Compound	BCR-712 PET bottle material		
<b>Chemical inertness (mg/dm<sup>2</sup>)</b>			
Toluene	7.3	±	0.6
Phenol	4.1	±	0.5
Limonene	3.9	±	0.5
Menthol	1.78	±	0.18
Phenylcyclohexane	3.5	±	0.4
Benzophenone	5.6	±	0.6

Availability: BCR-712 consists of the cylindrical wall middle part cut out from originally 1.5 L refillable multi-use PET bottles.

Parameters (determined according to ISO and ICC standards)	BCR-563 Common wheat flour		
Protein content % (Nx5.7) dry matter basis	11.71	±	0.13
Ash content % dry matter basis	0.562	±	0.008
Falling number / s	319	±	15
Zeleny sedimentation volume / mL	44	±	1
<b>CHOPIN ALVEOGRAPH</b>			
P/mmH <sub>2</sub> O*	80.8	±	2.1
L/mm**	109	±	7.2
P/L	0.8	±	0.1
W/(10 <sup>-4</sup> Joules)***	289.9	±	10.4
<b>BRABENDER FARINOGRAPH</b>			
Maximum consistency / BU (Brabender Units)	499	±	5
Development time / min.	1.7	±	0.3
Stability / min.	2.5	±	0.4
Degree of softening / BU (Brabender Units)	87	±	9
<b>BRABENDER EXTENSOGRAF</b>			
Maximum resistance / EU (Brabender Extensograph Units)	446	±	39
Resistance at 50 mm / EU (Brabender Extensograph Units)	261	±	30
Energy / (cm <sup>2</sup> )	119	±	14
Extensibility / mm	202	±	9
<b>MOISTURE MASS FRACTION</b> [g/100 g]	13.95	±	0.04

Availability: BCR-563 is provided in vacuum sealed laminated foil envelopes in units of approximately 360 g.

\* P: Mean curve height of Alveograph.

\*\* L: Mean curve length.

\*\*\* W: Area under Alveograph curve.

## 2.2.5 CERTIFIED FOR MICROBIOLOGICAL PROPERTIES

### BCR-506: Capsules filled with milk powder artificially contaminated by *Enterococcus faecium* (WR 63 / NCTC 13169)

Method	Number of colony forming particles in one analytical portion <sup>1)</sup>		
	Certified value <sup>2)</sup>	95 % confidence limits	
ISO 7899/2, 1984 KFA <sup>3)</sup>	76	71	- 81
ISO 7899/2, 1984 m-EA <sup>3)</sup>	72	63	- 82
ISO 6222, 1988 YA <sup>3)</sup>	109	102	- 117

Availability: BCR-506 is provided in containers holding 10 gelatine capsules filled with artificially contaminated milk powder.

1) Updated values obtained after recertification (June 1996): Number of colony forming particles of *Enterococcus faecium* determined in one analytical portion. Analytical portion: a volume of (1.00 ± 0.02) mL from 10 mL peptone saline solution in which one capsule has been reconstructed.

2) This value is the geometric mean of n accepted sets of data, independently obtained by 7 (KFA and m-EA) or 8 (YA) laboratories.

3) KFA-Kenner Faecal Streptococcus Agar. M-EA: membrane *Enterococcus* Agar, according to Slanetz and Bartley. YA: Yeast extract Agar.

**BCR-507R: Capsules filled with milk powder artificially contaminated by Salmonella typhimurium (ALM 40 / NCTC 13171)**  
**Colony forming particles per capsule / number of negative capsules**

Quantity (Test procedure)	Salmonella typhimurium	
	Certified value	95 % confidence limits
Number of colony forming particles per capsule <sup>1)</sup>	5.0	4.5 - 5.4 <sup>4)</sup>
Fraction (%) of capsules in which no salmonella could be detected (enumeration procedure) <sup>2)</sup>	1.1	0 - 2.1 <sup>5)</sup>
Fraction (%) of capsules in which no salmonella could be detected according to ISO 6579 (presence/absence procedure) <sup>3)</sup>	1.6	0 - 2.8 <sup>5)</sup>

Availability: BCR-507R is provided in containers holding 10 gelatine capsules filled with artificially contaminated milk powder.

1) Based on the results of 520 capsules.

4) Two sided 95 % confidence interval.

2) Based on the results of 554 capsules.

5) One sided 95 % confidence upper limit.

3) Based on the results of 506 capsules.

**BCR-527: Capsules filled with milk powder artificially contaminated by Enterobacter cloacae (WR 3 / NCTC 13168)**

Method	Number of colony forming particles in one analytical portion <sup>1)</sup>	
	Certified value <sup>2)</sup>	95 % confidence limits
ISO 9308-1, 1990 LSA	34	29 - 41

Availability: BCR-527 is provided in containers holding 10 gelatine capsules filled with artificially contaminated milk powder.

1) Number of colony forming particles of Enterobacter cloacae determined in one analytical portion. Analytical portion: A volume of (1.00 ± 0.02) mL from 10 mL peptone saline solution in which one capsule has been reconstituted.

2) This value is the geometric mean of 10 accepted sets of data, independently obtained by 10 laboratories.

**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.

**BCR-594: Capsules filled with milk powder artificially contaminated by Escherichia coli (WR 1 / NCTC 13167)**

Procedure	Number of colony forming particles in one analytical portion <sup>1)</sup>	
	Certified value <sup>2)</sup>	95 % confidence limits
ISO 9308-1, 1990 T7A 30/37	56	48- 66
ISO 9308-1, 1990 T7A 30/44	49	41- 59
ISO 9308-1, 1990 LSA 30/37	40	33- 48
ISO 9308-1, 1990 LSA 30/44	36	29- 44

Availability: BCR-594 is provided in containers holding 10 gelatine capsules filled with artificially contaminated milk powder.

1) Number of colony forming particles of Escherichia coli determined in one analytical portion. Analytical portion: A volume of (1.00 ± 0.02) mL from 10 mL peptone saline solution in which one capsule has been reconstituted.

2) This value is the geometric mean of n accepted sets of data, independently obtained by 7 (LSA) or 9 (T7A) laboratories.

**BCR-595: Capsules filled with milk powder artificially contaminated by *Listeria monocytogenes* (Scott A) (ALM 92 / NCTC 13173)**

Quantity (Procedure)	Certified value	95 % confidence limits
Number of colony forming particles per capsule (enumeration procedure) <sup>1)</sup>	7.2 <sup>3)</sup>	6.8 - 7.6 <sup>4)</sup>
Fraction of capsules in which no <i>L. monocytogenes</i> could be detected (enumeration procedure) <sup>1)</sup>	0.075 %	0.050 % - 0.11 % <sup>5)</sup>
Fraction of capsules in which no <i>L. monocytogenes</i> could be detected (presence/ absence procedure according to IDF standard 143) <sup>2)</sup>	1.2 %	0 - 2.3 % <sup>5)</sup>

Availability: BCR-595 is provided in containers holding 10 gelatine capsules filled with artificially contaminated milk powder.

1) Based on 11 accepted sets of data (549 capsules).

4) Two sided 95 % confidence interval.

2) Based on 12 accepted sets of data (564 capsules).

5) One sided 95 % confidence upper limit.

3) This value is the arithmetic mean of 11 accepted sets of data independently obtained by 11 laboratories.

**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-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	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 ( $\mu\text{g}$ )
Mass of genomic DNA <i>Escherichia coli</i> per vial	(1.3 $\pm$ 0.7)

Values in brackets are not certified.

Availability: Vial containing approximately 1.3  $\mu\text{g}$  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 ( $\mu\text{g/L}$ )		
<b>BCR-386</b> <sup>(1)</sup>	Bovine urine	Diethylstilboestrol (DES)	< 0.1		
<b>BCR-387</b> <sup>(1)</sup>	Bovine urine	Dienoestrol (DE)	< 0.1		
<b>BCR-388</b> <sup>(1)</sup>	Bovine urine	Hexoestrol (HEX)	< 0.1		
<b>BCR-389</b> <sup>(1)</sup>	Bovine urine	Diethylstilboestrol (DES)	12.8	$\pm$	2.5
<b>BCR-390 (RM)</b> <sup>(1)</sup>	Bovine urine	Dienoestrol (DE)	(34)		
<b>BCR-391</b> <sup>(1)</sup>	Bovine urine	Hexoestrol (HEX)	13.3	$\pm$	3.1
			Content	Relevant below the certified value	Relevant above the certified value
<b>BCR-502</b> <sup>(2)</sup>	Bovine urine	Clenbuterol	< 0.1		
		Salbutamol	< 0.2		
<b>BCR-503</b> <sup>(2)</sup>	Bovine urine	Clenbuterol	2.5	0.4	0.4
		Salbutamol	2.3	0.6	0.9
<b>BCR-504</b> <sup>(2)</sup>	Bovine urine	Clenbuterol	6.0	0.5	0.7
		Salbutamol	5.6	1.1	1.9

Value in brackets is not certified.

Availability: <sup>(1)</sup> Units of lyophilised urine equivalent to about 2.0 mL in vials sealed under nitrogen.

<sup>(2)</sup> Units of lyophilised urine equivalent to about 5.0 mL in vials sealed under nitrogen.

The reports give additional indicative values for trans- and cis-DES in BCR-389

	Description	Substance	Mass fraction in reconstituted sample ( $\mu\text{g/kg}$ )*		
<b>BCR-648</b>	Bovine liver	Clenbuterol	< 0.5		
<b>BCR-649</b>	Bovine liver	Clenbuterol	1.2	$\pm$	0.3
<b>BCR-474</b>	Bovine liver	17 $\alpha$ -trenbolone	< 0.5		
<b>BCR-475</b>	Bovine liver	17 $\alpha$ -trenbolone)	7.6 $\pm$	2.2	
<b>BCR-411</b>	Bovine muscle	Diethylstilboestrol	> 0.5		
<b>BCR-412</b>	Bovine muscle	Diethylstilboestrol	< 0.1		
<b>BCR-673</b>	Bovine eye	Clenbuterol	< 0.5		
<b>BCR-674</b>	Bovine eye	Clenbuterol	9	$\pm$	5

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-411 and -412 are provided 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) ( $\mu\text{g/kg}$ )	<b>ERM-BB130</b> Pork muscle ( $\mu\text{g/kg}$ )	<b>BCR-445</b> Porcine muscle (incurred) ( $\mu\text{g/kg}$ )
Chloramphenicol	< 0.2	0.230 $\pm$ 0.021	8.9 $\pm$ 0.9

Availability: BCR-444 and BCR-445 are 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-698</b>	Pig muscle	Chlortetracycline	0.29 ± 0.07
<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..

	<b>BCR-492</b> Milk powder (µg/kg)	<b>BCR-493</b> Milk powder (µg/kg)
Oxytetracycline	307 ± 14	< 10

Availability: Units of lyophilised milk equivalent to 10 mL sealed under dry nitrogen.

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.

	<b>ERM-BB124</b> 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 IRMM 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
<b>IRMM-481a</b>	Runners, Argentina	blanched, strong air-roasting	2 g	blue
<b>IRMM-481b</b>	Common Natal, South-Africa	raw, mild air-roasting	2 g	green
<b>IRMM-481c</b>	Virginia, USA,	blanched, strong oil roasting	2 g	gold
<b>IRMM-481d</b>	Virginia, China	blanched, mild oil-roasting	2 g	red
<b>IRMM-481e</b>	Jumbo Runners, USA,	blanched only	2 g	brown
<b>IRMM-481f</b>	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.

## 2.2.8 OTHERS

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

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

## 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	BCR-551 Acetonitrile solution Mass concentration (µg/mL)	BCR-552 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.

Substance	<b>BCR-555</b> Chlorinated hydrocarbons on Tenax (ng)
Dichloromethane	320 ± 40
1,1,1-Trichloroethane	370 ± 40
Trichloroethylene	390 ± 40
Perchloroethylene	327 ± 17
Toluene	57 ± 7

Availability: Stainless steel tube of 9.0 cm length and 0.25 inches outer diameter containing a single section of 250 mg TENAX GR, charged with 4 chlorinated hydrocarbons and toluene at the levels shown above.

	<b>BCR-562</b> BTX-aromatic compounds on charcoal Mass of sorbed aromatic hydrocarbon on charcoal per charged tube (µg)
Benzene	15.0 ± 0.4
Toluene	147 ± 4
m-Xylene	96.4 ± 2.5
o-Xylene	93.0 ± 2.9

Availability: One set contains 20 glass tubes containing a single section of charcoal. Of these, six are charged with the four aromatic hydrocarbons at the levels shown above. Two have been opened and sealed in the same manner as the charged tubes, but have not been charged; these are intended as a means to check that no contamination occurred after sealing. The other 12 tubes are unopened as received from the manufacturer, and are intended for determining the desorption efficiency of the charcoal.

	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-CE194</b>	Lyophilised bovine blood	Pb	126 ± 4
		Cd <sup>2)</sup>	0.20 ± 0.05
<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 IRMM.

	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.

### 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	Mass concentration in the reconstituted material <sup>1)</sup> (g/L)
<b>BCR-457</b>	Human Thyroglobulin (Tg)	0.324 ± 0.018

Availability: In units of lyophilised material in sealed glass ampoules under nitrogen.

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

	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.

	Description	HbA <sub>1c</sub> /Hb <sub>T</sub> in reconstituted material (%)
<b>BCR-405 (RM)</b>	Glycated haemoglobin (HbA <sub>1c</sub> ) in human haemolysate	(6.29 ± 0.18)

Value in brackets is not certified.

Availability: Sealed glass ampoules of lyophilised material equivalent to about 0.5 mL of a solution of haemolysate of human erythrocytes kept under carbonmonoxide.

<sup>1)</sup> Sample to be reconstituted with 1 mL of deionised water and diluted with appropriate haemolyzing reagent, taking into account that the total haemoglobin (Fe<sub>4</sub>) concentration is about 0.23 mmol/L (15 g/L).

<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
Complement 3c (C3c)	1.00 ± 0.04	Transferrin (TRF)	2.36 ± 0.08
Complement 4 (C4)	0.162 ± 0.007	Transthyretin (TTR)	0.220 ± 0.018

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-DA472/IFCC</b>	C-reactive protein (CRP)	41.8 ± 2.5

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

	Description	Absorbance at 540 nm and 10.00 mm pathlength	Mass concentration (mg/L)	Substance concentration ( $\mu$ mol/L)
<b>BCR-522</b>	Haemiglobincyanide (HiCN) in bovine blood lysate	0.5457 $\pm$ 0.0009	800.3 $\pm$ 1.3	49.61 $\pm$ 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 ( $\mu$ mol/L)
<b>BCR-573</b>	Creatinine in human serum	68.7 $\pm$ 1.4
<b>BCR-574</b>	Creatinine in human serum	105.0 $\pm$ 1.3
<b>BCR-575</b>	Creatinine in human serum	404.1 $\pm$ 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-466</b>	Haemoglobin isolated from whole blood	HbA1c/(Hba0 + HbA1c)
<b>IRMM/IFCC-467</b>	Haemoglobin isolated from whole blood	Hba0/(HbA1c + Hba0)

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

### 3.2.4 CERTIFIED FOR CATALYTIC ACTIVITY

	Description	Catalytic concentration in reconstituted material Certified value	
		U/L	$\mu$ kat/L
<b>BCR-410</b>	Prostatic acid phosphatase highly purified, from human prostate <sup>2)</sup>	28.0 $\pm$ 0.7	0.466 $\pm$ 0.012
<b>BCR-647</b>	Human adenosine deaminase (ADA1), from human erythrocytes <sup>2)</sup>		2.55 $\pm$ 0.09
<b>BCR-693</b>	Human pancreatic lipase from pancreatic juice <sup>4)</sup>		28.9 $\pm$ 1.2
<b>BCR-694</b>	Human pancreatic lipase (recombinant) <sup>4)</sup>		17.4 $\pm$ 1.0
<b>ERM-AD452/IFCC</b>	$\gamma$ -Glutamyltransferase partially purified, from pig kidney <sup>3)</sup>	114.1 $\pm$ 2.4	1.90 $\pm$ 0.04
<b>ERM-AD453/IFCC</b>	Human lactate dehydrogenase isoenzyme 1 <sup>3)</sup>	502 $\pm$ 7	8.37 $\pm$ 0.12
<b>ERM-AD454/IFCC</b>	Alanine aminotransferase partially purified, from pig heart <sup>3)</sup>	186 $\pm$ 4	3.09 $\pm$ 0.07
<b>ERM-AD455/IFCC</b>	Creatine kinase CK-MB from human heart <sup>3)</sup>	101 $\pm$ 4	1.68 $\pm$ 0.07
<b>IRMM/IFCC-456</b>	Human pancreatic $\alpha$ -Amylase <sup>3)</sup>		9.1 $\pm$ 0.3
<b>ERM-AD457/IFCC</b>	Aspartate Transaminase (AST)	104.6 $\pm$ 2.7	1.74 $\pm$ 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 human (BCR-410 and ERM-AD453/IFCC) or bovine (ERM-AD452/IFCC, ERM-AD454/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-AD455/IFCC and IRMM/IFCC-456 are provided in sealed ampoules or vials filled with dry nitrogen. Samples are in lyophilised form and equivalent to about 1 mL of a solution of purified enzyme. 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

	Plasmid DNA	
<b>IRMM/IFCC-490</b>	Sequence of 609 bp DNA fragment from human prothrombin gene (G20210 wildtype sequence)	$p < 3 \times 10^{-6}$
<b>IRMM/IFCC-491</b>	Sequence of 609 bp DNA fragment from human prothrombin gene (point mutation G20210A)	$p < 3 \times 10^{-6}$
<b>IRMM/IFCC-492</b>	Sequence of 609 bp DNA fragments from human prothrombin (G20210 wildtype and point mutation G20210A sequences)	$p < 3 \times 10^{-6}$

Availability: Each polypropylene vial contains approximately 1 ng plasmid DNA in a volume of 50  $\mu$ L of a Tris/EDTA solution.

### 3.2.6 OTHERS

	Description	Parameters of the calibration line	
<b>ERM-AD148</b>	Lyophilised thromboplastin Bovine (OBT/79)	Slope 1.011	$\pm 0.015$
		intercept - 0.321	$\pm 0.025$
<b>ERM-AD149</b>	Lyophilised rabbit thromboplastin	Slope 1.257	$\pm 0.013$
		Intercept - 0.242	$\pm 0.019$

Availability: ERM-AD148 in units of lyophilised bovine brain thromboplastin equivalent to about 2.2 g bovine brain tissue extract kept under vacuum in sealed glass ampoules.

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 $\mu$ m in length in million per g dry tissue)	<b>BCR-666</b> Asbestos fibres in lung tissue (Number of fibres of more than 1 $\mu$ m in length in million per g dry tissue)
Amosite + crocidolite	49 $\pm$ 16	2.3 $\pm$ 0.9
Anthophyllite	1.8 $\pm$ 0.9	5.1 $\pm$ 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 $\pm$ 0.04 mL
Sodium release per volume of leachate	1.41 $\pm$ 0.14 mg/L
Release of Na <sub>2</sub> O per volume of leachate	1.91 $\pm$ 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

$$\lambda \text{ [W/(m.K)]} = 0.029\,394\,9 + 0.000\,106\,0 \times T \text{ [}^\circ\text{C]} + 2.047 \times 10^{-7} \times T^2 \text{ [}^\circ\text{C}^2\text{]}$$

This equation is valid for a sample of the reference material within the density range [64 kg/m<sup>3</sup> - 78 kg/m<sup>3</sup>].

The uncertainty of the certified thermal conductivity is  $\pm 0.000\,28$  W/(m.K) at the 95 % confidence level

over the range [- 10 °C / + 50 °C].

Availability: Boards which can be cut to: (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

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

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

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

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-724C: diameter = 25.9 mm, height > 22 mm; BCR-724D: diameter = 26.9 mm, height > 22 mm; BCR-724E: diameter = 50.7 mm, height > 25 mm).

	Description	Thickness (mm)	Approx. Dimensions (cm)	Density (kg/m <sup>3</sup> )	Property
<b>BCR-039 (B and C)</b>	Pyrex glass	30, 50	30 x 30 *	2222 - 2226	Thermal conductivity at 23 °C 1.143 8 (W/mK) ( $\pm 1.7$ %)

\* Samples of 50 x 50 cm can be obtained on request.

	Description	Cold filter plugging point CFPP Temperature (°C)
<b>BCR-395</b>	Gasoil	- 5.8 $\pm$ 0.4

Availability: Sealed jar which conforms to the dimension given in EN 116, ready for use in the apparatus without need to transfer the material.

Indicative value of cloud point – 5 °C.

Substance	BCR-182 Steam Coal (mg/kg)		
C	$732.9 \times 10^3$	±	$2.2 \times 10^3$
H		(42.2 × 10 <sup>3</sup> )	
N	$16.36 \times 10^3$	±	$0.30 \times 10^3$
Cl	$3.70 \times 10^3$	±	$0.07 \times 10^3$
As		(1.47)	
Cd	0.057	±	0.004
Co		(8.7)	
Cr		(20)	
Hg	0.040	±	0.007
Mn	195	±	6
Ni		(39)	
Pb		(15.3)	
Se	0.68	±	0.07
V	24.3	±	1.0
Zn	33.3	±	1.5
Al		(15.6 × 10 <sup>3</sup> )	
B		(31.2)	
Br		(36.5)	
Ce		(17)	
Cu		(12.3)	
Fe		(7.3 × 10 <sup>3</sup> )	
K		(4.3 × 10 <sup>3</sup> )	
La		(8)	
Rb		(22)	
Sc		(3.8)	
Th		(2.3)	
Ti		(0.6 × 10 <sup>3</sup> )	
Vol. Matter (g/kg)		(288)	
Ash (g/kg)	122.7	±	1.0
GCV (J/G)	29680	±	70

Values in brackets are not certified.

Availability: BCR-182 is available in units of about 20 g in a sealed glass ampoule.

BCR-182 (steam coal) is a medium volatile coal of high ash content. It was selected to cover the range of properties of interest for industrial uses.

## 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 150 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-661 can be supplied in 3 bars of 150 mm long and diameter 14 mm or as 1 bar of 500 mm long, sufficient for the manufacture of three test-pieces.

## Scratch testing BCR-692

Failure event	Critical load	
	Certified value (N)	Uncertainty (N)
Forward chevron cracks at the borders of the scratch track. <i>(L<sub>C1</sub> shall be taken at the closest end of the event to the scratch track start).</i>	(L <sub>C1</sub> ) 13.6	1.8
Forward chevron cracks at the borders of the scratch track, with local interfacial spallation or with gross interfacial spallation. <i>(L<sub>C2</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>	(L <sub>C2</sub> ) 17.0	2.1
Gross interfacial shell-shaped spallation. <i>(L<sub>C3</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>	(L <sub>C3</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) for tests at room temperature.

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.

<b>ERM-FA013</b>	30 J	<b>ERM-FA016</b>	120 J
<b>ERM-FA014</b>	60 J	<b>ERM-FA415</b>	150 J
<b>ERM-FA015</b>	80 J		

### 4.3 CERTIFIED FOR MORPHOLOGICAL PROPERTIES

Particle size distributions				
	Form of Quartz	Certified Property	Size Range ( $\mu\text{m}$ )	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 ( $\mu\text{m}$ )	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

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

#### Mullite ( $3\text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2$ ) BCR-301 (RM)

High crystallinity.

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

Impurities in g/kg:

$\text{Fe}_2\text{O}_3$	< 2	$\text{Na}_2\text{O}$	< 1
$\text{CaO}$	< 1.2	$\text{K}_2\text{O}$	< 0.5
$\text{MgO}$	< 0.5	$\text{TiO}_2$	< 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

### Microcrystalline cellulose BCR-302 (Water content at 10 water activities)

The water content of the material when in equilibrium with the atmosphere above each saturated salt solution specified in the table was determined at 25 °C by the method recommended by COST 90. BCR-302 is specifically intended to check the correct application of the COST procedure for determination of water sorption isotherms of foods.

Nominal water activity $a_w$ at 25 °C	Certified equilibrium water content mass fraction g/kg)	Specified saturated salt aqueous solution
0.1105	21.3 ± 1.1	1 Lithium Chloride
0.2245	32.4 ± 1.3	2 Potassium Acetate
0.3300	41.5 ± 0.9	3 Magnesium Chloride
0.4276	51.6 ± 0.9	4 Potassium Carbonate
0.5286	59.7 ± 1.4	5 Magnesium Nitrate
0.5770	64.7 ± 1.5	6 Sodium Bromide
0.7083	82.5 ± 1.7	7 Strontium Chloride
0.7528	88.9 ± 2.4	8 Sodium Chloride
0.8426	110 ± 4	9 Potassium Chloride
0.9019	133 ± 5	10 Barium Chloride

Availability: 20 g in sealed sachets.

	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.

### Thickness of silicon dioxide on silicon BCR-564

With the trend towards the use of gate oxides with thicknesses around 10 nm the silicon oxide/silicon interface characteristics gain more and more importance. Reference materials of silicon dioxide layers of nominal thickness of 10, 50 and 120 nm on silicon wafers have been prepared to be used as calibration standards for ellipsometry. They provide the means for a quantitative analysis of oxides thicker than 10 nm. Each standard is individually certified.

Availability: Set of three standards (16 × 16 mm): 1 standard each of 10, 50 and 120 nm SiO<sub>2</sub> on silicon wafer.

### 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 × 10 mm of each oxide thickness.

### Colloidal Silica - Water-based suspension of silica nanoparticles (IRMM-304)

IRMM-304 is **not** a certified reference material but a Quality Control Material. It consists of silica nanoparticles suspended in an aqueous solution. It is available in an amber glass ampoule containing approximately 9 mL material.

## 4.4 CERTIFIED FOR OPTICAL PROPERTIES

### Tomato paste colour reference tile BCR-400

BCR-400 consists of a ceramic tile the colour of which is defined by Hunter L, a and b values. If other data are needed these may be calculated readily for the same geometry or illuminant / standard observer (45°/0° or 0°/45° viewing geometry, illuminant C/2° standard observer combination, aperture of  $\geq 50$  mm nominal diameter. The nominal Hunter values of the tiles are: L = 26, a = 33 and b = 14.5. Each tile is individually certified, the overall uncertainties on L, a and b being  $\pm 0.3$ ,  $\pm 0.4$  and  $\pm 0.3$  respectively.

BCR-400 is intended for calibration purpose only and does not represent a standard tomato paste colour.

### White reference material BCR-406 A

The material (opal glass) is a reference for colorimeters and spectrophotometers measuring colour in reflection. The spectral reflectance is certified at 13 wavelengths between 400 nm and 1 200 nm with a value higher than 93 % between 450 nm and 800 nm.

The specimens are circular plates 14 mm thick.

One size is available: 50 mm  $\varnothing$  (A). One side is polished, and the other side is mat.

## 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 $\pm$ 0.05
n-Heptane, purity by difference	999.85 $\pm$ 0.05	
<u>Impurities</u>		
Total organics (other than isooctane)		0.11 $\pm$ 0.04
Total organics (other than n-Heptane)	0.12 $\pm$ 0.05	
Isooctane	0.07 $\pm$ 0.02	
n-Heptane		0.02 $\pm$ 0.02
Water	0.03 $\pm$ 0.02	0.04 $\pm$ 0.02

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

	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-033</b>	Super-phosphate	P <sub>2</sub> O <sub>5</sub>	193.4 ± 1.2
		SO <sub>4</sub>	428.0 ± 4.1
		CaO	314.8 ± 3.1
		SiO <sub>2</sub>	29.2 ± 1.2
		F	16.5 ± 0.5
		Al <sub>2</sub> O <sub>3</sub>	11.0 ± 0.8
		Fe <sub>2</sub> O <sub>3</sub>	4.0 ± 0.2
<b>BCR-113</b>	Potassium Chloride	MgO	2.1 ± 0.2
		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
<b>BCR-114</b>	Potassium Sulphate	water soluble K	501.3 ± 0.7
		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
<b>BCR-178</b>	Calcium Ammonium Nitrate	Mg	0.74 ± 0.01
		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
		Ca	88.82 ± 0.27
<b>BCR-179</b>	Urea	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.

	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.

Substance	BCR-126A		
	Lead crystal glass (cg/g)		
SiO <sub>2</sub>	57.80	±	0.11
PbO	23.98	±	0.06
K <sub>2</sub> O	9.99	±	0.07
Al <sub>2</sub> O <sub>3</sub>	0.126	±	0.013
Fe <sub>2</sub> O <sub>3</sub>	0.005 5	±	0.001 2
Sb <sub>2</sub> O <sub>3</sub>	0.291	±	0.012
BaO	1.053	±	0.030
CaO	1.033	±	0.030
MgO	0.512	±	0.013
ZnO	1.01	±	0.04
Na <sub>2</sub> O	3.57	±	0.07
Li <sub>2</sub> O	0.494	±	0.016
Density at 20 °C	2.990 5	±	0.001 6 g/cm <sup>3</sup>
Refractive index n <sub>D</sub> <sup>20 °C</sup> at 589.3 nm	1.559 67	±	0.000 22

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
<b>IRMM-521</b>	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)
<b>IRMM-522</b>	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)
<b>IRMM-523</b>	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)
<b>IRMM-524</b>	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)
<b>IRMM-525</b>	Nb	19.6 ± 1.8 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)
<b>IRMM-526</b>	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)
<b>IRMM-529</b>	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)
<b>IRMM-531</b>	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)
<b>IRMM-527R</b>	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)
<b>IRMM-528R</b>	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)
<b>IRMM-530R</b>	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)
<b>IRMM-532</b>	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)
<b>IRMM-533</b>	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)
<b>IRMM-534</b>	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 Copper (electrolytic tough pitch)	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 ± 12	∅ 7 mm, h 50 mm ∅ 7 mm, h 50 mm
<b>BCR-055</b>	Lead (refined)	O	1.0 ± 0.5	∅ 30 mm, h 9 mm
<b>BCR-099</b>	Nickel	O N	8.4 ± 1.3 1.1 ± 0.3	25 cubes of 2 g
<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 approx. 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 ± 101	∅ 4.5 mm, h 2 mm (bottle with approx. 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, -287A and -288A: 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-358</b> ZnAl4Cu1 (mg/kg)	<b>BCR-359</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>	[39.46±0.13] × 10 <sup>3</sup>	[37.11±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	10.22 ± 0.13	29.8 ± 0.4	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>	[7.93 ± 0.04] × 10 <sup>3</sup>	[9.89 ± 0.04] × 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	40.5 ± 0.4	119.7 ± 1.1		10.34 ± 0.26
In	< 0.2	3.30 ± 0.14	7.04 ± 0.09	15.5 ± 0.6	29.8 ± 0.6	(< 0.2)
Mg	132.3 ± 1.8	273 ± 4	403 ± 4	557 ± 5	705 ± 5	
Ni	3.43 ± 0.19	9.82 ± 0.25	26.98 ± 0.24	92.6 ± 0.6	267 ± 8	
Pb	9.87 ± 0.23	13.8 ± 0.6	22.5 ± 0.8	36.2 ± 0.8	73.9 ± 1.4	5.31 ± 0.20
Sn	(0.32 ± 0.16)	3.51 ± 0.14	7.87 ± 0.18	16.93 ± 0.22	33.0 ± 0.8	46.3 ± 0.9
Tl	0.79 ± 0.05	2.76 ± 0.05	6.09 ± 0.25	13.34 ± 0.24	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 (g/kg)	<b>BCR-090</b> Titanium with added impurities (g/kg)
Al	59.7 ± 0.4	
B		0.0282 ± 0.0014
Co		0.501 ± 0.014
Cr		0.533 ± 0.011
Cu		0.513 ± 0.009
Fe		0.563 ± 0.016
Mn		0.314 ± 0.010
Mo		0.488 ± 0.011
Nb		(0.492 ± 0.026)
Ni		0.667 ± 0.007
Sn		(0.71 ± 0.05)
V	39.76 ± 0.29	
W		(0.50 ± 0.04)
Zr		(0.436 ± 0.013)

Values in brackets are not certified.

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

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

Availability: Bottles containing about 10 g of chips.

Substance	<b>BCR-074</b>		
	Electrolytic copper (OFHC) (mg/kg)		
Ag	12.8	±	0.7
As	0.78	±	0.14
Bi	(0.10)	±	0.03)
Cd		<	0.02
Co		<	0.05
Cr		<	0.1
Fe	1.14	±	0.06
Mn	1.27	±	0.05
Ni	1.04	±	0.11
Pb	0.97	±	0.05
Sb	0.576	±	0.030
Se	0.37	±	0.04
Sn		<	0.07
Te	(0.21)	±	0.08)
Zn	0.46	±	0.07

Values in brackets are not certified.

Availability: CRMs are available as follows:

BCR-074A: Cylinder of 40 mm Ø, 30 mm height

BCR-074C: Small pieces in a bottle containing about 50 g

	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.

Substance	<b>BCR-182</b>		
	Steam Coal		
C (g/kg)	732.9	±	2.2
N (g/kg)	16.36	±	0.30
Cl (g/kg)	3.70	±	0.07
Cd (mg/kg)	0.057	±	0.004
Hg (mg/kg)	0.040	±	0.007
Mn (mg/kg)	195	±	6
Se (mg/kg)	0.68	±	0.07
V (mg/kg)	24.3	±	1.0
Zn (mg/kg)	33.3	±	1.5
Ash (g/kg)	122.7	±	1.0
GCV (MJ/kg)	29.68	±	0.7

Availability: units of about 20 g in a sealed glass ampoule.

BCR-182 (steam coal) is a medium volatile coal of high ash content. It was selected to cover the range of properties of interest for industrial uses.

	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-333</b>	Coking Steam Coal	13.44	± 0.26
<b>BCR-334</b>	Anthracite	16.09	± 0.19
<b>BCR-335</b>	Flame Coal	50.8	± 0.6
<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	±
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	±

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
<b>ERM-EF318</b>	Gasoil	7.0	± 0.4

Availability: The materials are available in dark glass ampoules sealed under nitrogen, containing 20 mL.

Certified Parameter	<b>IRMM-441</b> n-Heptane (%)		<b>IRMM-442</b> Isooctane (%)	
	n-Heptane, purity by difference	99.985	± 0.005	99.985
Isooctane, purity by difference				
<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	<b>BCR-664</b> 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.

	Material	Uranium mass fraction (mg/kg)		
<b>IRMM-540R</b>	Uranium-doped oxide glass	15.0	±	0.9
<b>IRMM-541</b>	Uranium-doped oxide glass	49.4	±	2.7

Availability: Glass disc of 15 mm diameter and 2 mm thickness, polished on both sides.

Substance	<b>ERM-EC590</b> Polyethylene (LDPE) g/kg			<b>ERM-EC591</b> Polypropylene (PP) g/kg		
	Br	2.13	±	0.09	2.08	±
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',3,4,4'-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	<b>ERM-EC680k</b> Polyethylene (low level) mg/kg			<b>ERM-EC681k</b> Polyethylene (high level)			
	As	4.1	±	0.5	29.1	±	1.8
Br	96	±	4	0.77	±	0.04	g/kg
Cd	19.6	±	1.4	137	±	4	mg/kg
Cl	102.2	±	3.0	0.80	±	0.05	g/kg
Cr	20.2	±	1.1	100	±	5	mg/kg
Hg	4.64	±	0.20	23.7	±	0.8	mg/kg
Pb	13.6	±	0.5	98	±	6	mg/kg
S	76	±	4	0.63	±	0.04	g/kg
Sb	10.1	±	1.6	99	±	6	mg/kg
Sn	(15.3)	±	(2.8)	(86)	±	6	mg/kg
Zn	(137)	±	(20)	(1.25)	±	0.07	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 IRMM on behalf of VDA (Verband der Automobilindustrie e.V., Frankfurt). Information can be obtained from IRMM, 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.

## 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-658 (Synthetic wine)	BCR-659 (Synthetic wine)	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
δ <sup>18</sup> O <sub>V-SMOW</sub> of water from wine by IRMS	‰			-7.19 ± 0.04	-7.18 ± 0.02	
(D/H) <sub>w</sub> of water (IRMS)	ppm					148.68 ± 0.14
Alcoholic grade t <sub>D</sub>	w/w %	94.61 ± 0.05				11.96 ± 0.06 <sup>1)</sup>

1) in v/v %

Availability: BCR-656: Units of 25 mL of 96 % vol. neutral ethanol from wine in glass bottle;  
 BCR-657: Units of approx. 1 g of dry glucose in a sealed amber vial;  
 BCR-658: Units of 25 mL of synthetic wine solution in glass bottle;  
 BCR-659: Units of 25 mL of synthetic wine solution in glass bottle;  
 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	0.6 M HNO <sub>3</sub> solution	1.011 4(68) · 10 <sup>-6</sup>	25 mL
ERM-AE701/2		1.023 5(69) · 10 <sup>-7</sup>	
ERM-AE701/3		1.018 1(69) · 10 <sup>-8</sup>	
ERM-AE701/4		1.047 9(71) · 10 <sup>-9</sup>	
ERM-AE701/5		1.052 0(71) · 10 <sup>-10</sup>	
ERM-AE701/6		1.091 3(74) · 10 <sup>-11</sup>	
ERM-AE701/7		1.054 9(72) · 10 <sup>-12</sup>	
ERM-AE701/8		1.052 4(71) · 10 <sup>-13</sup>	

Code	Description	Isotope amount fraction (·100)						Amount ratios			Unit size
IRMM-009	0.2 M HNO <sub>3</sub> solution	<sup>24</sup> Mg	<sup>25</sup> Mg	<sup>26</sup> Mg				$n(^{25}\text{Mg})/n(^{24}\text{Mg})$	$n(^{26}\text{Mg})/n(^{24}\text{Mg})$		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-011	H <sub>3</sub> BO <sub>3</sub> solid	<sup>10</sup> B	<sup>11</sup> B					$n(^{10}\text{B})/n(^{11}\text{B})$			1 g
		19.824 (20)	80.176(20)					0.247 26(32)			
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-014	Fe metal	<sup>54</sup> Fe	<sup>56</sup> Fe	<sup>57</sup> Fe	<sup>58</sup> Fe			$n(^{54}\text{Fe})/n(^{56}\text{Fe})$	$n(^{57}\text{Fe})/n(^{56}\text{Fe})$	$n(^{58}\text{Fe})/n(^{56}\text{Fe})$	35 mg (wires) or 250 mg (cubes)
		5.845(23)	91.754(24)	2.119 1(66)	0.281 9(28)			0.063 70(27)	0.023 096(72)	0.003 071(29)	
IRMM-015	Li <sub>2</sub> CO <sub>3</sub> solid	<sup>6</sup> Li	<sup>7</sup> Li					$n(^{6}\text{Li})/n(^{7}\text{Li})$			50 mg
		95.632 6(84)	4.367 4(84)					21.897(44)			
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)					0.082 121(87)			
IRMM-017	Si solid	<sup>28</sup> Si	<sup>29</sup> Si	<sup>30</sup> Si				$n(^{29}\text{Si})/n(^{28}\text{Si})$	$n(^{30}\text{Si})/n(^{28}\text{Si})$		50 mg
		92.228 77(86)	4.682 59(58)	3.088 64(70)				0.050 771 5(76)	0.033 488 9(82)		
IRMM-018a	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)	3.092 34(37)				0.050 827 2(40)	0.033 532 0(42)		

## 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
IRMM-635	1 M HNO <sub>3</sub> solution	58.131(37)	μmol <sup>84</sup> Sr·kg <sup>-1</sup>	$n(^{86}\text{Sr})/n(^{84}\text{Sr})$ =0.000 589 (10) $n(^{87}\text{Sr})/n(^{84}\text{Sr})$ =0.000 098 (10) $n(^{88}\text{Sr})/n(^{84}\text{Sr})$ =0.000 386 (10)	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 <sup>202</sup> Hg·g <sup>-1</sup>	$n(^{196}\text{Hg})/n(^{202}\text{Hg}) = 0.000\ 018\ 09\ (38)$ $n(^{198}\text{Hg})/n(^{202}\text{Hg}) = 0.000\ 623\ (11)$ $n(^{199}\text{Hg})/n(^{202}\text{Hg}) = 0.001\ 603\ (16)$ $n(^{200}\text{Hg})/n(^{202}\text{Hg}) = 0.005\ 499\ (34)$ $n(^{201}\text{Hg})/n(^{202}\text{Hg}) = 0.013\ 351\ (52)$ $n(^{204}\text{Hg})/n(^{202}\text{Hg}) = 0.002\ 595\ (21)$	5 mL
<b>ERM-AE641</b>	Cl in water	18.959 (15)	μmol <sup>35</sup> Cl·g <sup>-1</sup>	$n(^{37}\text{Cl})/n(^{35}\text{Cl}) = 0.319\ 77\ (83)$	4 - 5 mL
<b>ERM-AE642</b>	Cl in water	4.375 (26)	μmol <sup>37</sup> Cl·g <sup>-1</sup>	$n(^{35}\text{Cl})/n(^{37}\text{Cl}) = 0.019\ 14\ (48)$	4 - 5 mL
<b>IRMM-643</b>	2.8 M HNO <sub>3</sub> solution	334.33 (84)	μmol <sup>32</sup> S·kg <sup>-1</sup>	$n(^{33}\text{S})/n(^{32}\text{S}) = 0.007\ 877\ 6\ (58)$ $n(^{34}\text{S})/n(^{32}\text{S}) = 0.044\ 149\ 3\ (78)$ $n(^{36}\text{S})/n(^{32}\text{S}) = 0.000\ 153\ 40\ (94)$	5 mL
<b>IRMM-644</b>	3.2 M HNO <sub>3</sub> solution	326.28 (80)	μmol <sup>32</sup> S·kg <sup>-1</sup>	$n(^{33}\text{S})/n(^{32}\text{S}) = 0.007\ 969\ 8\ (70)$ $n(^{34}\text{S})/n(^{32}\text{S}) = 0.045\ 162\ 2\ (82)$ $n(^{36}\text{S})/n(^{32}\text{S}) = 0.000\ 170\ 0\ (58)$	5 mL
<b>IRMM-645</b>	2.8 M HNO <sub>3</sub> solution	371.96 (57)	μmol <sup>32</sup> S·kg <sup>-1</sup>	$n(^{33}\text{S})/n(^{32}\text{S}) = 0.007\ 747\ 6\ (38)$ $n(^{34}\text{S})/n(^{32}\text{S}) = 0.042\ 747\ 3\ (62)$ $n(^{36}\text{S})/n(^{32}\text{S}) = 0.000\ 145\ 1\ (42)$	5 mL
<b>IRMM-646</b>	2.8 M HNO <sub>3</sub> solution	4586 (27)	μmol <sup>34</sup> S·kg <sup>-1</sup>	$n(^{32}\text{S})/n(^{34}\text{S}) = 0.038\ 314\ 9\ (31)$ $n(^{33}\text{S})/n(^{34}\text{S}) = 0.000\ 470\ 88\ (15)$ $n(^{36}\text{S})/n(^{34}\text{S}) = 0.000\ 018\ 1\ (37)$	5 mL
<b>ERM-AE647</b>	1 M HNO <sub>3</sub> solution	134.974 (73)	μmol <sup>63</sup> Cu·g <sup>-1</sup>	$n(^{65}\text{Cu})/n(^{63}\text{Cu}) = 0.445\ 60\ (74)$	4 mL
<b>ERM-AE649</b>	1 M HNO <sub>3</sub> solution	0.836 88 (27)	μmol <sup>205</sup> Tl·g <sup>-1</sup>	$n(^{203}\text{Tl})/n(^{205}\text{Tl}) = 0.418\ 91\ (18)$	4 - 5 mL
<b>IRMM-651</b>	0.5 M HNO <sub>3</sub> solution	0.077 506 (30)	μmol <sup>64</sup> Zn·g <sup>-1</sup>	$n(^{66}\text{Zn})/n(^{64}\text{Zn}) = 0.557\ 17\ (30)$ $n(^{67}\text{Zn})/n(^{64}\text{Zn}) = 0.080\ 702\ (34)$ $n(^{68}\text{Zn})/n(^{64}\text{Zn}) = 0.366\ 27\ (12)$ $n(^{70}\text{Zn})/n(^{64}\text{Zn}) = 0.011\ 981\ (22)$	5 mL
<b>IRMM-652</b>	0.5 M HNO <sub>3</sub> solution	0.156 000 (50)	μmol <sup>64</sup> Zn·g <sup>-1</sup>	$n(^{66}\text{Zn})/n(^{64}\text{Zn}) = 0.004\ 107\ 3\ (59)$ $n(^{67}\text{Zn})/n(^{64}\text{Zn}) = 0.000\ 499\ 87\ (96)$ $n(^{68}\text{Zn})/n(^{64}\text{Zn}) = 0.002\ 029\ 5\ (23)$ $n(^{70}\text{Zn})/n(^{64}\text{Zn}) = 0.000\ 052\ 76\ (34)$	5 mL
<b>IRMM-653</b>	0.5 M HNO <sub>3</sub> solution	0.138 014 (60)	μmol <sup>67</sup> Zn·g <sup>-1</sup>	$n(^{64}\text{Zn})/n(^{67}\text{Zn}) = 0.013\ 191\ 5\ (81)$ $n(^{66}\text{Zn})/n(^{67}\text{Zn}) = 0.024\ 551\ 6\ (70)$ $n(^{68}\text{Zn})/n(^{67}\text{Zn}) = 0.051\ 086\ (36)$ $n(^{70}\text{Zn})/n(^{67}\text{Zn}) = 0.000\ 527\ 8\ (18)$	5 mL
<b>IRMM-654</b>	0.5 M HNO <sub>3</sub> solution	0.146 098 (48)	μmol <sup>68</sup> Zn·g <sup>-1</sup>	$n(^{64}\text{Zn})/n(^{68}\text{Zn}) = 0.00\ 489\ 4\ (38)$ $n(^{66}\text{Zn})/n(^{68}\text{Zn}) = 0.003\ 186\ 8\ (46)$ $n(^{67}\text{Zn})/n(^{68}\text{Zn}) = 0.001\ 411\ 3\ (17)$ $n(^{70}\text{Zn})/n(^{68}\text{Zn}) = 0.000\ 194\ 98\ (78)$	5 mL
<b>IRMM-3702</b>	1 M HNO <sub>3</sub> solution	1.512 (30)	μmol <sup>64</sup> Zn·g <sup>-1</sup>	$n(^{66}\text{Zn})/n(^{64}\text{Zn}) = 0.563\ 97\ (30)$ $n(^{67}\text{Zn})/n(^{64}\text{Zn}) = 0.082\ 166\ (35)$ $n(^{68}\text{Zn})/n(^{64}\text{Zn}) = 0.375\ 19\ (16)$ $n(^{70}\text{Zn})/n(^{64}\text{Zn}) = 0.012\ 418\ (23)$	3 mL

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ERM-AD453/IFCC	HUMAN LACTATE DEHYDROGENASE ISOENZYME 1 (catalytic concentration)	54
ERM-AD454/IFCC	ALANINE AMINOTRANSFERASE (catalytic concentration)	54
ERM-AD455/IFCC	CREATINE KINASE (CK-MB iso-enzyme) (catalytic concentration)	54
ERM-AD457/IFCC	ASPARTATE TRANSAMINASE (AST)	54
ERM-AE633	COPPER (natural) spike, nitrate solution	72
ERM-AE637	MAGNESIUM (natural) spike, nitrate solution	72
ERM-AE638	MAGNESIUM-26 spike, nitrate solution	72
ERM-AE639	MERCURY (natural) spike, chloride solution	72
ERM-AE640	MERCURY-202 spike, chloride solution	73
ERM-AE641	CHLORIDE (natural) spike, chloride solution	73
ERM-AE642	CHLORIDE-37 spike, chloride solution	73
ERM-AE647	COPPER-63, nitrate solution	73
ERM-AE649	THALLIUM (natural) spike, nitrate solution	73
ERM-AE701	CALCIUM-41 isotopic, nitrate solution (set of 8 units)	71
ERM-BB124	PORK MUSCLE	48
ERM-BB130	PORK MUSCLE	47
ERM-BB350	FISH OIL	33
ERM-BB384	PORK MUSCLE	38, 41
ERM-BB444	NATURAL PORK FAT (blank)	33
ERM-BB445	SPIKED PORK FAT (very low level)	33
ERM-BB446	SPIKED PORK FAT (low level)	33
ERM-BC190	RAPESEED (colza) (S, total glucosinolate, medium level)	35
ERM-BC366	RAPESEED (colza) (S, total glucosinolate, low level)	35
ERM-BC367	RAPESEED (colza) (S, total glucosinolate, high level)	35
ERM-BC381	RYE FLOUR	38, 41
ERM-BC382	WHEAT FLOUR	38, 41
ERM-BC514	HARICOTS BEANS (dietary fibre)	42
ERM-BC515	CARROT (dietary fibre)	42
ERM-BC516	APPLE (dietary fibre)	42
ERM-BC517	FULL FAT SOYA (dietary fibre)	42
ERM-BC716	MAIZE	36
ERM-BC717	MAIZE	36
ERM-BD273	TOASTED BREAD	49
ERM-BD282	WHOLE MILK POWDER (aflatoxin M1, zero level)	35
ERM-BD283	WHOLE MILK POWDER (aflatoxin M1, low level)	35
ERM-BD284	WHOLE MILK POWDER (aflatoxin M1, high level)	35
ERM-BD518	BRAN BREAKFAST CEREAL (dietary fibre)	42

ERM-BE375	COMPOUND FEEDINGSTUFF (very low level)	35
ERM-BE376	COMPOUND FEEDINGSTUFF (high level)	35
ERM-BF410a	GENETICALLY MODIFIED ROUNDUP READY SOYA (blank)	27
ERM-BF410b	GENETICALLY MODIFIED ROUNDUP READY SOYA (level 1)	27
ERM-BF410c	GENETICALLY MODIFIED ROUNDUP READY SOYA (level 2)	27
ERM-BF410dk	GENETICALLY MODIFIED ROUNDUP READY SOYA (level 3)	27
ERM-BF410e	GENETICALLY MODIFIED ROUNDUP READY SOYA (level 4)	27
ERM-BF410gk	GENETICALLY MODIFIED ROUNDUP READY SOYA (level 6)	27
ERM-BF411a	GENETICALLY MODIFIED Bt-176 MAIZE (blank)	27
ERM-BF411b	GENETICALLY MODIFIED Bt-176 MAIZE (level 1)	27
ERM-BF411c	GENETICALLY MODIFIED Bt-176 MAIZE (level 2)	27
ERM-BF411d	GENETICALLY MODIFIED Bt-176 MAIZE (level 3)	27
ERM-BF411e	GENETICALLY MODIFIED Bt-176 MAIZE (level 4)	27
ERM-BF411f	GENETICALLY MODIFIED Bt-176 MAIZE (level 5)	27
ERM-BF412a	GENETICALLY MODIFIED Bt-11 MAIZE (blank)	27
ERM-BF412b	GENETICALLY MODIFIED Bt-11 MAIZE (level 1)	27
ERM-BF412c	GENETICALLY MODIFIED Bt-11 MAIZE (level 2)	27
ERM-BF412d	GENETICALLY MODIFIED Bt-11 MAIZE (level 3)	27
ERM-BF412e	GENETICALLY MODIFIED Bt-11 MAIZE (level 4)	27
ERM-BF412f	GENETICALLY MODIFIED Bt-11 MAIZE (level 5)	27
ERM-BF413a	GENETICALLY MODIFIED MON 810 MAIZE (blank)	28
ERM-BF413b	GENETICALLY MODIFIED MON 810 MAIZE (level 1)	28
ERM-BF413c	GENETICALLY MODIFIED MON 810 MAIZE (level 2)	28
ERM-BF413d	GENETICALLY MODIFIED MON 810 MAIZE (level 3)	28
ERM-BF413e	GENETICALLY MODIFIED MON 810 MAIZE (level 4)	28
ERM-BF413f	GENETICALLY MODIFIED MON 810 MAIZE (level 5)	28
ERM-BF414a	GENETICALLY MODIFIED GA21 MAIZE (blank)	28
ERM-BF414b	GENETICALLY MODIFIED GA21 MAIZE (level 1)	28
ERM-BF414c	GENETICALLY MODIFIED GA21 MAIZE (level 2)	28
ERM-BF414d	GENETICALLY MODIFIED GA21 MAIZE (level 3)	28
ERM-BF414e	GENETICALLY MODIFIED GA21 MAIZE (level 4)	28
ERM-BF414f	GENETICALLY MODIFIED GA21 MAIZE (level 5)	28
ERM-BF415a	GENETICALLY MODIFIED NK603 MAIZE (blank)	29
ERM-BF415b	GENETICALLY MODIFIED NK603 MAIZE (level 1)	29
ERM-BF415c	GENETICALLY MODIFIED NK603 MAIZE (level 2)	29
ERM-BF415d	GENETICALLY MODIFIED NK603 MAIZE (level 3)	29
ERM-BF415e	GENETICALLY MODIFIED NK603 MAIZE (level 4)	29
ERM-BF415f	GENETICALLY MODIFIED NK603 MAIZE (level 5)	29
ERM-BF416a	GENETICALLY MODIFIED MON 863 MAIZE (blank)	29
ERM-BF416b	GENETICALLY MODIFIED MON 863 MAIZE (level 1)	29
ERM-BF416c	GENETICALLY MODIFIED MON 863 MAIZE (level 2)	29
ERM-BF416d	GENETICALLY MODIFIED MON 863 MAIZE (level 3)	29
ERM-BF417a	GENETICALLY MODIFIED MON 863 x MON 810 MAIZE (blank)	29
ERM-BF417b	GENETICALLY MODIFIED MON 863 x MON 810 MAIZE (level 1)	29
ERM-BF417c	GENETICALLY MODIFIED MON 863 x MON 810 MAIZE (level 2)	29
ERM-BF417d	GENETICALLY MODIFIED MON 863 x MON 810 MAIZE (level 3)	29
ERM-BF418a	GENETICALLY MODIFIED 1507 MAIZE (blank)	29
ERM-BF418b	GENETICALLY MODIFIED 1507 MAIZE (level 1)	29
ERM-BF418c	GENETICALLY MODIFIED 1507 MAIZE (level 2)	29
ERM-BF418d	GENETICALLY MODIFIED 1507 MAIZE (level 3)	29
ERM-BF419a	GENETICALLY MODIFIED H7-1 SUGAR BEET (blank)	30
ERM-BF419b	GENETICALLY MODIFIED H7-1 SUGAR BEET (level 1)	30
ERM-BF420a	GENETICALLY MODIFIED 3272 MAIZE (blank)	30
ERM-BF420b	GENETICALLY MODIFIED 3272 MAIZE (level 1)	30

ERM-BF420c	GENETICALLY MODIFIED 3272 MAIZE (level 2)	30
ERM-BF421a	GENETICALLY MODIFIED EH92-527-1 POTATO (blank)	30
ERM-BF421b	GENETICALLY MODIFIED EH92-527-1 POTATO (level 1)	30
ERM-BF422a	GENETICALLY MODIFIED 281-24-236 X 3006-210-23 COTTON SEED (blank)	30
ERM-BF422b	GENETICALLY MODIFIED 281-24-236 X 3006-210-23 COTTON SEED (level 1)	30
ERM-BF422c	GENETICALLY MODIFIED 281-24-236 X 3006-210-23 COTTON SEED (level 2)	30
ERM-BF422d	GENETICALLY MODIFIED 281-24-236 X 3006-210-23 COTTON SEED (level 3)	30
ERM-BF423a	GENETICALLY MODIFIED MIR604 MAIZE (blank)	31
ERM-BF423b	GENETICALLY MODIFIED MIR604 MAIZE (level 1)	31
ERM-BF423c	GENETICALLY MODIFIED MIR604 MAIZE (level 2)	31
ERM-BF423d	GENETICALLY MODIFIED MIR604 MAIZE (level 3)	31
ERM-BF424a	GENETICALLY MODIFIED 59122 MAIZE (blank)	31
ERM-BF424b	GENETICALLY MODIFIED 59122 MAIZE (level 1)	31
ERM-BF424c	GENETICALLY MODIFIED 59122 MAIZE (level 2)	31
ERM-BF424d	GENETICALLY MODIFIED 59122 MAIZE (level 3)	31
ERM-BF425a	GENETICALLY MODIFIED SOYA 356043 (blank)	31
ERM-BF425b	GENETICALLY MODIFIED SOYA 356043 (level 1)	31
ERM-BF425c	GENETICALLY MODIFIED SOYA 356043 (level 2)	31
ERM-BF425d	GENETICALLY MODIFIED SOYA 356043 (level 3)	31
ERM-BF426a	GENETICALLY MODIFIED SOYA 305423 (blank)	31
ERM-BF426b	GENETICALLY MODIFIED SOYA 305423 (level 1)	31
ERM-BF426c	GENETICALLY MODIFIED SOYA 305423 (level 2)	31
ERM-BF426d	GENETICALLY MODIFIED SOYA 305423 (level 3)	31
ERM-BF427a	GENETICALLY MODIFIED 98140 MAIZE (blank)	32
ERM-BF427b	GENETICALLY MODIFIED 98140 MAIZE (level 1)	32
ERM-BF427c	GENETICALLY MODIFIED 98140 MAIZE (level 2)	32
ERM-BF427d	GENETICALLY MODIFIED 98140 MAIZE (level 3)	32
ERM-BF428a	GENETICALLY MODIFIED GHB119 COTTON (blank)	32
ERM-BF428b	GENETICALLY MODIFIED GHB119 COTTON (level 1)	32
ERM-BF428c	GENETICALLY MODIFIED GHB119 COTTON (level 2)	32
ERM-BF429a	GENETICALLY MODIFIED T304-40 COTTON (blank)	32
ERM-BF429b	GENETICALLY MODIFIED T304-40 COTTON (level 1)	32
ERM-BF429c	GENETICALLY MODIFIED T304-40 COTTON (level 2)	32
ERM-CA408	SIMULATED RAINWATER (major components)	16
ERM-CA615	GROUND WATER	17
ERM-CA616	GROUND WATER	17
ERM-CC141	LOAM SOIL	9
ERM-CC580	ESTUARINE SEDIMENT (Hg, methylmercury)	11, 19
ERM-CC690	CALCAREOUS SOIL	10
ERM-CD281	RYE GRASS	13
ERM-CE194	BOVINE BLOOD (Pb, Cd)	52
ERM-CE195	BOVINE BLOOD (Pb, Cd)	52
ERM-CE196	BOVINE BLOOD (Pb, Cd)	52
ERM-CE278	MUSSEL TISSUE (trace elements)	15
ERM-CE464	TUNA FISH (total and methylmercury)	15, 20
ERM-CE477	MUSSEL TISSUE (butyltins)	20
ERM-DA192	HUMAN SERUM (cortisol unspiked)	51
ERM-DA193	HUMAN SERUM (cortisol spiked)	51
ERM-DA347	HUMAN SERUM (progesterone)	51
ERM-DA451/IFCC	CORTISOL REFERENCE SERUM PANEL	51
ERM-DA470k/IFCC	HUMAN SERUM (proteins)	53
ERM-DA471/IFCC	HUMAN SERUM (cystatin C)	53
ERM-DA472/IFCC	HUMAN SERUM (CRP)	53
ERM-EB322	UNALLOYED ZINC (trace elements)	64

ERM-EB323	UNALLOYED ZINC (trace elements)	64
ERM-EB324	UNALLOYED ZINC (trace elements)	64
ERM-EB325	UNALLOYED ZINC (trace elements)	64
ERM-EC590	POLYETHYLENE (LDPE)	69
ERM-EC591	POLYPROPYLENE (PP)	69
ERM-EC680k	POLYETHYLENE (low level)	69
ERM-EC681k	POLYETHYLENE (high level)	69
ERM-EF104	GAS OIL (0.1019 % S)	67
ERM-EF211	PETROL	67
ERM-EF317	GAS OIL (Solvent Yellow 124)	67
ERM-EF318	GAS OIL (Solvent Yellow 124)	67
ERM-EF671	GAS OIL (0.0452 % S)	67
ERM-EF672	GAS OIL (0.0203 % S)	67
ERM-EG001	ANTIMONY IMPLANTED IN SILICON	70
ERM-FA013	CHARPY SPECIMENS 30 J (impact toughness)	58
ERM-FA014	CHARPY SPECIMENS 60 J (impact toughness)	58
ERM-FA015	CHARPY SPECIMENS 80 J (impact toughness)	58
ERM-FA016	CHARPY SPECIMENS 120 J (impact toughness)	58
ERM-FA415	CHARPY SPECIMENS 150 J (impact toughness)	58
BCR-010	TIN ORE CONCENTRATE (Sn)	62
BCR-017A, B	COPPER (S, P)	64
BCR-022A, B	ELECTROLYTIC TOUGH PITCH COPPER (O)	64
BCR-024B, C	TITANIUM (O, N)	64
BCR-032	MOROCCAN PHOSPHATE ROCK (trace elements)	62, 68
BCR-033	SUPERPHOSPHATE (various parameters)	62
BCR-038	FLY ASH FROM PULVERISED COAL (trace elements)	11
BCR-039B, C	PYREX GLASS (thermal conductivity)	56
BCR-046	BENZO[b]CHRYSENE (purity)	1
BCR-047	BENZO[b]FLUORANTHENE (purity)	1
BCR-048R	BENZO[k]FLUORANTHENE (purity)	1
BCR-049	BENZO[j]FLUORANTHENE (purity)	1
BCR-050	BENZO[e]PYRENE (purity)	1
BCR-052	BENZO[ghi]PERYLENE (purity)	1
BCR-054R	COPPER (O)	64
BCR-055	REFINED PURE LEAD (O)	64
BCR-058	CONTINUOUS CAST COPPER (O)	64
BCR-059A, B	Ti 6AL 4V ALLOY (O)	64
BCR-060	AQUATIC PLANT (Lagarosiphon major) (trace elements)	12
BCR-063R	SKIM MILK POWDER (major and trace elements)	15
BCR-066	QUARTZ (particle size 0.35 - 3.50 microns)	59
BCR-067	QUARTZ (particle size 2.40 - 32.00 microns)	59
BCR-068	QUARTZ (particle size 160 - 630 microns)	59
BCR-069	QUARTZ (particle size 14 - 90 microns)	59
BCR-070	QUARTZ (1.20 - 20.00 microns)	59
BCR-074A, C	ELECTROLYTIC COPPER (trace elements)	66
BCR-077R	1-METHYLCHRYSENE (purity)	1
BCR-078R	2-METHYLCHRYSENE (purity)	1
BCR-079R	3-METHYLCHRYSENE (purity)	1
BCR-080R	4-METHYLCHRYSENE (purity)	1
BCR-081R	5-METHYLCHRYSENE (purity)	1
BCR-082R	6-METHYLCHRYSENE (purity)	1
BCR-089	TiAl6V4 (Al, V)	65
BCR-090A, B	TITANIUM (impurities)	65

BCR-091	ANTHANTHRENE (purity)	1
BCR-092	10-AZABENZO[a]PYRENE (purity)	1
BCR-093R	1-METHYLBENZ[a]ANTHRACENE (purity)	1
BCR-094	DIBENZ[a.c]ANTHRACENE (purity)	1
BCR-095	DIBENZ[a.j]ANTHRACENE (purity)	1
BCR-096	DIBENZO[a.l]PYRENE (purity)	1
BCR-097	BENZO[a]FLUORANTHENE (purity)	1
BCR-098	ZIRCALOY-4 (trace element impurities)	65
BCR-099	NICKEL (N, O)	64
BCR-100	BEECH LEAVES (trace elements)	12
BCR-102	TUNGSTEN CARBIDE POWDER (O)	64
BCR-105	GAS OIL (0.363 % S)	67
BCR-106	GAS OIL (0.502 % S)	67
BCR-107	GAS OIL (1.040 % S)	67
BCR-109	ZINC ORE CONCENTRATE (trace elements)	68
BCR-110	ZINC ORE CONCENTRATE (trace elements)	68
BCR-112	AROMATIC HYDROCARBONS ON TENAX (BTX)	23
BCR-113	POTASSIUM CHLORIDE FERTILIZER (elemental composition)	62
BCR-114	POTASSIUM SULPHATE FERTILIZER (elemental composition)	62
BCR-115	ANIMAL FEED (Organochlorine pesticides)	34
BCR-116	LIMESTONE POWDERS (for shear testing)	57
BCR-121	WHOLEMEAL FLOUR (vitamins)	40
BCR-122	MARGARINE (vitamins)	40
BCR-123A, B	3 REFERENCE ETHANOLS (H, M, L) (for SNIF-NMR)	24, 70
BCR-126A	LEAD GLASS (composition/refractive index)	63
BCR-128	FLY ASH ON ARTIFICIAL FILTERS (surface density)	12
BCR-129	HAY POWDER (elements)	13
BCR-130	QUARTZ (particle size 50 - 220 microns)	59
BCR-131	QUARTZ (particle size 480 - 1800 microns)	59
BCR-132	QUARTZ (particle size 1400 - 5000 microns)	59
BCR-133	DIBENZO[a.e]PYRENE (purity)	1
BCR-134	BENZO[c]PHENANTHRENE (purity)	1
BCR-136R	BENZO[b]NAPHTHO[2,3-d]THIOPHENE (purity)	1
BCR-137R	BENZO[b]NAPHTHO[1,2-d]THIOPHENE (purity)	1
BCR-138	DIBENZO[a.h]ANTHRACENE (purity)	1
BCR-139	BENZO[gh]FLUORANTHENE (purity)	1
BCR-140	BENZO[c]CHRYSENE (purity)	1
BCR-142R	LIGHT SANDY SOIL (trace elements)	9
BCR-143R	SEWAGE SLUDGE AMENDED SOIL (trace elements)	9
BCR-145R	SEWAGE SLUDGE (mixed origin) (trace elements)	11
BCR-146R	SEWAGE SLUDGE (industrial origin) (trace elements)	11
BCR-150	SPIKED SKIM MILK POWDER (trace elements)	36
BCR-151	SPIKED SKIM MILK POWDER (trace elements)	36
BCR-152	DIBENZ[a.l]ACRIDINE (purity)	1
BCR-153R	DIBENZ[a,h]ACRIDINE (purity)	1
BCR-154	DIBENZ[a.j]ACRIDINE (purity)	1
BCR-155	DIBENZ[a,c]ACRIDINE (purity)	1
BCR-156R	DIBENZ[c,h]ACRIDINE (purity)	1
BCR-157	BENZ[a]ACRIDINE (purity)	1
BCR-158	BENZ[c]ACRIDINE (purity)	1
BCR-159	DIBENZO[a,h]PYRENE (purity)	1
BCR-160R	FLUORANTHENE (purity)	1
BCR-162R	SOYA-MAIZE OIL BLEND (fatty acid profile)	38
BCR-163	BEEF-PORK FAT BLEND (fatty acid profile)	38

BCR-165	LATEX SPHERES (particle diameter 2 microns)	50
BCR-166	LATEX SPHERES (particle diameter 4.8 microns)	50
BCR-167	LATEX SPHERES (particle diameter 9.6 microns)	50
BCR-168	PICENE (purity)	1
BCR-169	ALPHA ALUMINA (0.10 m <sup>2</sup> /g) (nitrogen BET specific surface area)	59
BCR-170	ALPHA ALUMINA (1.05 m <sup>2</sup> /g) (nitrogen BET specific surface area)	59
BCR-171	ALUMINA (2.95 m <sup>2</sup> /g) (nitrogen BET specific surface area)	59
BCR-172	QUARTZ (2.50 m <sup>2</sup> /g) (nitrogen BET specific surface area)	59
BCR-173	TITANIA (8.23 m <sup>2</sup> /g) (nitrogen BET specific surface area)	59
BCR-175	TUNGSTEN (0.18 m <sup>2</sup> /g) (nitrogen BET specific surface area)	59
BCR-176R	FLY ASH (trace elements)	12
BCR-177R	PYRENE (purity)	1
BCR-178	CALCIUM AMMONIUM NITRATE FERTILIZER (composition)	62
BCR-179	UREA FERTILIZER (composition)	62
BCR-182	STEAM COAL (elements, ash, gross calorific value)	57, 66
BCR-185R	BOVINE LIVER (trace elements)	36
BCR-187	NATURAL MILK POWDER (pesticides)	34
BCR-188	SPIKED MILK POWDER (pesticides)	34
BCR-191	BROWN BREAD (trace elements)	37
BCR-261T	TANTALUM PENTOXIDE ON TANTALUM FOIL	60
BCR-262R	DEFATTED PEANUT MEAL (aflatoxin B1, blank)	35
BCR-263R	DEFATTED PEANUT MEAL (aflatoxin B1, medium level)	35
BCR-264	DEFATTED PEANUT MEAL (aflatoxin B1, high level)	35
BCR-265	DIBENZO[a,e]FLUORANTHENE (purity)	1
BCR-266	7H-DIBENZO (c.g) CARBAZOLE (purity)	1
BCR-267	INDENO[1,2,3-cd]FLUORANTHENE (purity)	1
BCR-269	CHRYSENE (purity)	1
BCR-270	TRIPHENYLENE (purity)	1
BCR-271	BENZ[a]ANTHRACENE (purity)	1
BCR-272	CORONENE (purity)	1
BCR-273	SINGLE CELL PROTEIN (major elements)	37
BCR-274	SINGLE CELL PROTEIN (trace elements)	37
BCR-275	ZIRCALOY (C, N, O)	64
BCR-276	ZIRCALOY (C, N, O)	64
BCR-277R	ESTUARINE SEDIMENT (trace elements)	10
BCR-279	SEA LETTUCE (ulva-lactuca) (trace elements)	14
BCR-280R	LAKE SEDIMENT (trace elements)	10
BCR-286A, B	ELECTROLYTICALLY REFINED LEAD (trace elements)	64
BCR-287A, B	THERMALLY REFINED LEAD (trace elements)	64
BCR-288A, B	LEAD WITH ADDED IMPURITIES (trace elements)	64
BCR-289	2,4'-DICHLOROBIPHENYL (IUPAC No. 8) (purity)	2
BCR-290	2,3,3'-TRICHLOROBIPHENYL (IUPAC No. 20) (purity)	2
BCR-291	2,4,4'-TRICHLOROBIPHENYL (IUPAC No. 28) (purity)	2
BCR-293	2,2',5,5'-TETRACHLOROBIPHENYL (IUPAC No. 52) (purity)	2
BCR-296	2,2',3,4,4',5'-HEXACHLOROBIPHENYL (IUPAC No. 138) (purity)	2
BCR-297	2,2',4,4',5,5'-HEXACHLOROBIPHENYL (IUPAC No. 153) (purity)	2
BCR-298	2,2',3,4,4',5,5'-HEPTACHLOROBIPHENYL (IUPAC No. 180) (purity)	2
BCR-301 (RM)	MULLITE (lattice spacing, other parameters)	59
BCR-302	MICROCRYSTALLINE CELLULOSE (water content above saturated solutions)	60
BCR-304	HUMAN SERUM (Ca, Mg, Li)	52
BCR-305	1-NITROPYRENE (purity)	2
BCR-306	1-NITRONAPHTALENE (purity)	2
BCR-307	2-NITRONAPHTALENE (purity)	2
BCR-308	9-NITROANTHRACENE (purity)	2

BCR-309	6-NITROCHRYSENE (purity)	2
BCR-310	3-NITROFLUORANTHENE (purity)	2
BCR-311	6-NITROBENZO[a]PYRENE (purity)	2
BCR-312	2-NITRO-7-METHOXYNAPHTHO[2,1-b]FURAN (purity)	2
BCR-318	TITANIUM (H)	64
BCR-320R	CHANNEL SEDIMENT (trace elements)	10
BCR-321	UNALLOYED ZINC (trace elements)	64
BCR-326	UNALLOYED ZINC (disc) (trace elements)	64
BCR-327	UNALLOYED ZINC (disc) (trace elements)	64
BCR-331	LOW VOLATILE STEAM COAL (S)	66
BCR-332	HIGH VOLATILE INDUSTRIAL COAL (S)	66
BCR-333	COKING STEAM COAL (S)	66
BCR-334	ANTHRACITE (S)	66
BCR-335	FLAME COAL (S)	66
BCR-336	HIGH VOLATILE STEAM COAL (S)	66
BCR-337	DIBENZO[b,d]FURAN (purity)	2
BCR-338	4H-CYCLOPENTA[def]PHENANTHREN-4-ONE (purity)	2
BCR-339	BENZO[c,d]PYREN-6-ONE (purity)	2
BCR-340	BENZO[b]NAPHTHO (1,2-d) FURAN (purity)	2
BCR-341	BENZO[b]NAPHTHO (2,1-d) FURAN (purity)	2
BCR-342	BENZO[a]FLUORENONE (purity)	2
BCR-348R	HUMAN SERUM (high progesterone)	51
BCR-349	COD LIVER OIL (PCBs)	33
BCR-351	ZnAl4 (trace elements)	65
BCR-352	ZnAl4 (trace elements)	65
BCR-353	ZnAl4 (trace elements)	65
BCR-354	ZnAl4 (trace elements)	65
BCR-355	ZnAl4 (trace elements)	65
BCR-356	ZnAl4Cu1 (trace elements)	65
BCR-357	ZnAl4Cu1 (trace elements)	65
BCR-358	ZnAl4Cu1 (trace elements)	65
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IRMM-632	COPPER-65 spike, nitrate solution	72
IRMM-634	IRON (natural) spike, chloride solution	72
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IRMM-804	RICE FLOUR	37
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STA-003k	TETRAMETHYLUREA	25
VDA 001-004	POLYETHYLENE (40, 75, 200, 400 mg/kg Cd)	69

## ALPHABETICAL LIST

DESIGNATION	ERM / CRM	PAGE NO.
$\gamma$ -GLUTAMYLTRANSFERASE (catalytic concentration)	ERM-AD452/IFCC	54
10-AZABENZO[a]PYRENE (purity)	BCR-092	1
1-METHYLBENZ[a]ANTHRACENE (purity)	BCR-093R	1
1-METHYLCHRYSENE (purity)	BCR-077R	1
1-NITRONAPHTALENE (purity)	BCR-306	2
1-NITROPYRENE (purity)	BCR-305	2
2,2',3,4,4',5,5'-HEPTACHLOROBIPHENYL (IUPAC No. 180) (purity)	BCR-298	2
2,2',3,4,4',5'-HEXACHLOROBIPHENYL (IUPAC No. 138) (purity)	BCR-296	2
2,2',4,4',5,5'-HEXACHLOROBIPHENYL (IUPAC No. 153) (purity)	BCR-297	2
2,2',5,5'-TETRACHLOROBIPHENYL (IUPAC No. 52) (purity)	BCR-293	2
2,3,3'-TRICHLOROBIPHENYL (IUPAC No. 20) (purity)	BCR-290	2
2,4,4'-TRICHLOROBIPHENYL (IUPAC No. 28) (purity)	BCR-291	2
2,4'-DICHLOROBIPHENYL (IUPAC No. 8) (purity)	BCR-289	2
2,4-DINITROPHENYLHYDRAZONES in ACETONITRILE	BCR-551	49
2,4-DINITROPHENYLHYDRAZONES in ACETONITRILE (blank)	BCR-552	49
2-METHYLCHRYSENE (purity)	BCR-078R	1
2-NITRO-7-METHOXYNAPHTHO[2,1-b]FURAN (purity)	BCR-312	2
2-NITRONAPHTALENE (purity)	BCR-307	2
3 REFERENCE ETHANOLS (H, M, L) (for SNIF-NMR)	BCR-123A, B	24, 70
3,3',5 TRIIODOTHYRONINE (T3)	IRMM-469	50
3-METHYLCHRYSENE (purity)	BCR-079R	1
3-NITROFLUORANTHENE (purity)	BCR-310	2
4-DEOXYNIVALENOL in acetonitrile	IRMM-315	26
4H-CYCLOPENTA[def]PHENANTHREN-4-ONE (purity)	BCR-338	2
4-METHYLCHRYSENE (purity)	BCR-080R	1
5-METHYLCHRYSENE (purity)	BCR-081R	1
6-METHYLCHRYSENE (purity)	BCR-082R	1
6-NITROBENZO[a]PYRENE (purity)	BCR-311	2
6-NITROCHRYSENE (purity)	BCR-309	2
7H-DIBENZO (c.g) CARBAZOLE (purity)	BCR-266	1
9-NITROANTHRACENE (purity)	BCR-308	2
ACETALDEHYDE-2,4-DINITROPHENYLHYDRAZONE (purity)	BCR-547	49
ACETONE-2,4-DINITROPHENYLHYDRAZONE (purity)	BCR-549	49
ACROLEIN-2,4-DINITROPHENYLHYDRAZONE (purity)	BCR-548	49
AFLATOXIN B1 IN ACETONITRILE	ERM-AC057	26
AFLATOXIN B2 IN ACETONITRILE	ERM-AC058	26
AFLATOXIN G1 IN ACETONITRILE	ERM-AC059	26
AFLATOXIN G2 IN ACETONITRILE	ERM-AC060	26
AFLATOXIN M1 STANDARD SOLUTION	BCR-423 (RM)	25
Al	IRMM-523	63
Al-0.01 % Co	IRMM-532	63
Al-0.1 % Ag	IRMM-533	63
Al-0.1 % Au	IRMM-530R	63
Al-0.1 % Co	IRMM-527R	63
Al-1.0 % Co	IRMM-528R	63
Al-2.0 % Sc	IRMM-534	63
ALANINE AMINOTRANSFERASE (catalytic concentration)	ERM-AD454/IFCC	54
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ALPHA ALUMINA (1.05 m <sup>2</sup> /g) (nitrogen BET specific surface area)	BCR-170	59

ALPHA-AMYLASE (catalytic concentration)	IRMM/IFCC-456	54
ALUMINA (2.95 m <sup>2</sup> /g) (nitrogen BET specific surface area)	BCR-171	59
ANHYDROUS BUTTER FAT (tracers)	BCR-633	39
ANHYDROUS BUTTER FAT (triglycerides)	BCR-519	39
ANIMAL FEED (Organochlorine pesticides)	BCR-115	34
ANTHANTHRENE (purity)	BCR-091	1
ANTHRACITE (S)	BCR-334	66
ANTIMONY IMPLANTED IN SILICON	ERM-EG001	70
APPLE (dietary fibre)	ERM-BC516	42
AQUATIC PLANT (Cr)	BCR-596	12
AQUATIC PLANT (Lagarosiphon major) (trace elements)	BCR-060	12
AROMATIC HYDROCARBONS ON TENAX (BTX)	BCR-112	23
AROMATIC HYDROCARBONS SORBED ON CHARCOAL	BCR-562	50
ARTIFICIAL FOODSTUFF (major nutrients)	BCR-644	41
ARTIFICIAL FOODSTUFF (major nutrients)	BCR-645	41
ARTIFICIAL GROUND WATER (trace elements, low carbonate content)	BCR-617	17
ASPARTATE TRANSAMINASE (AST)	ERM-AD457/IFCC	54
BACILLUS CEREUS (number of colony forming particles)	BCR-528	44
BEECH LEAVES (trace elements)	BCR-100	12
BEECH WOOD	BCR-683	23
BEEF-PORK FAT BLEND (fatty acid profile)	BCR-163	38
BEER (EtOH, low level)	BCR-651	41
BEER (EtOH, very low level)	BCR-652	41
BENZ[a]ACRIDINE (purity)	BCR-157	1
BENZ[a]ANTHRACENE (purity)	BCR-271	1
BENZ[c]ACRIDINE (purity)	BCR-158	1
BENZO[a]FLUORANTHENE (purity)	BCR-097	1
BENZO[a]FLUORENONE (purity)	BCR-342	2
BENZO[b]CHRYSENE (purity)	BCR-046	1
BENZO[b]FLUORANTHENE (purity)	BCR-047	1
BENZO[b]NAPHTHO (1,2-d) FURAN (purity)	BCR-340	2
BENZO[b]NAPHTHO (2,1-d) FURAN (purity)	BCR-341	2
BENZO[b]NAPHTHO[1,2-d]THIOPHENE (purity)	BCR-137R	1
BENZO[b]NAPHTHO[2,3-d]THIOPHENE (purity)	BCR-136R	1
BENZO[c,d]PYREN-6-ONE (purity)	BCR-339	2
BENZO[c]CHRYSENE (purity)	BCR-140	1
BENZO[c]PHENANTHRENE (purity)	BCR-134	1
BENZO[e]PYRENE (purity)	BCR-050	1
BENZO[gh]FLUORANTHENE (purity)	BCR-139	1
BENZO[gh]PERYLENE (purity)	BCR-052	1
BENZO[j]FLUORANTHENE (purity)	BCR-049	1
BENZO[k]FLUORANTHENE (purity)	BCR-048R	1
BORIC ACID, isotopic, solid	IRMM-011	71
BORON (natural) spike, aqueous solution	IRMM-611	72
BORON-10 spike, aqueous solution	IRMM-610	72
BOVINE BLOOD (Pb, Cd)	ERM-CE194	52
BOVINE BLOOD (Pb, Cd)	ERM-CE195	52
BOVINE BLOOD (Pb, Cd)	ERM-CE196	52
BOVINE BLOOD LYSATE (haemiglobincyanide)	BCR-522	54
BOVINE EYE (CLENBUTEROL BLANK)	BCR-673	47
BOVINE EYE (CLENBUTEROL POSITIVE)	BCR-674	47
BOVINE LIVER (CLENBUTEROL BLANK)	BCR-648	47
BOVINE LIVER (CLENBUTEROL POSITIVE)	BCR-649	47
BOVINE LIVER (trace elements)	BCR-185R	36

BOVINE LIVER (trenbolone blank and positive)	BCR-474-5	47
BOVINE MUSCLE (diethylstilboestrol blank)	BCR-412	47
BOVINE MUSCLE (diethylstilboestrol positive)	BCR-411	47
BOVINE URINE (clenbuterol and salbutamol)	BCR-502	47
BOVINE URINE (clenbuterol and salbutamol)	BCR-503	47
BOVINE URINE (clenbuterol and salbutamol)	BCR-504	47
BOVINE URINE (dienoestrol blank)	BCR-387	47
BOVINE URINE (dienoestrol positive)	BCR-390 (RM)	47
BOVINE URINE (diethylstilboestrol blank)	BCR-386	47
BOVINE URINE (diethylstilboestrol positive)	BCR-389	47
BOVINE URINE (hexoestrol blank)	BCR-388	47
BOVINE URINE (hexoestrol positive)	BCR-391	47
BRAN BREAKFAST CEREAL (dietary fibre)	ERM-BD518	42
BROWN BREAD (trace elements)	BCR-191	37
BRUSSELS SPROUT (vitamins)	BCR-431	40
BUTTER FAT	BCR-632	40
CADMIUM-111 spike, nitrate solution	IRMM-621	72
CADMIUM-111 spike, nitrate solution	IRMM-622	72
CALCAREOUS SOIL	ERM-CC690	10
CALCIUM AMMONIUM NITRATE FERTILIZER (composition)	BCR-178	62
CALCIUM-41 isotopic, nitrate solution (set of 8 units)	ERM-AE701	71
CANDIDA ALBICANS (NCPF 3179)	IRMM-354	46
CARROT (dietary fibre)	ERM-BC515	42
CHANNEL SEDIMENT (trace elements)	BCR-320R	10
CHARPY SPECIMENS 120 J (impact toughness)	ERM-FA016	58
CHARPY SPECIMENS 150 J (impact toughness)	ERM-FA415	58
CHARPY SPECIMENS 30 J (impact toughness)	ERM-FA013	58
CHARPY SPECIMENS 60 J (impact toughness)	ERM-FA014	58
CHARPY SPECIMENS 80 J (impact toughness)	ERM-FA015	58
CHLORIDE (natural) spike, chloride solution	ERM-AE641	73
CHLORIDE-37 spike, chloride solution	ERM-AE642	73
CHLORINATED HYDROCARBONS ON TENAX	BCR-555	50
CHROMIUM (natural) spike, chloride solution	IRMM-625	72
CHROMIUM, isotopic, chloride solution	IRMM-012	71
CHROMIUM-50 spike, chloride solution	IRMM-624	72
CHRYSENE (purity)	BCR-269	1
CHUB (PCBs)	BCR-719	23
CLAY (F)	BCR-461	67
COAL (F)	BCR-460	67
COASTAL SEAWATER (Hg)	BCR-579	16
COASTAL SEDIMENT (butyltins)	BCR-462	19
COCOA BUTTER	IRMM-801	39
COCONUT OIL (PAH blank)	BCR-459	32
COCONUT OIL (PAH doped)	BCR-458	32
COD LIVER OIL (Organochlorine pesticides)	BCR-598	33
COD LIVER OIL (PCBs)	BCR-349	33
COKING STEAM COAL (S)	BCR-333	66
COLLOIDAL SILICA	IRMM-304	61
COMMON WHEAT FLOUR (properties)	BCR-563	43
COMPOUND FEED (aflatoxin B1 blank)	BCR-375	35
COMPOUND FEEDINGSTUFF (high level)	ERM-BE376	35
COMPOUND FEEDINGSTUFF (very low level)	ERM-BE375	35
CONTINUOUS CAST COPPER (O)	BCR-058	64
COPPER (natural) spike, nitrate solution	ERM-AE633	72

COPPER (O)	BCR-054R	64
COPPER (S, P)	BCR-017A, B	64
COPPER ALLOYS	BCR-691	66
COPPER-63, nitrate solution	ERM-AE647	73
COPPER-65 spike, nitrate solution	IRMM-632	72
CORONENE (purity)	BCR-272	1
CORTISOL REFERENCE SERUM PANEL	ERM-DA451/IFCC	51
CREATINE KINASE (CK-MB iso-enzyme) (catalytic concentration)	ERM-AD455/IFCC	54
CREATININE (interfering substances)	BCR-573i	54
Cu	IRMM-522	63
DAIRY FEED (nutritional properties)	BCR-708	42
DEFATTED PEANUT MEAL (aflatoxin B1, blank)	BCR-262R	35
DEFATTED PEANUT MEAL (aflatoxin B1, high level)	BCR-264	35
DEFATTED PEANUT MEAL (aflatoxin B1, medium level)	BCR-263R	35
DIBENZ[a,c]ACRIDINE (purity)	BCR-155	1
DIBENZ[a,h]ACRIDINE (purity)	BCR-153R	1
DIBENZ[a,l]ACRIDINE (purity)	BCR-152	1
DIBENZ[a,j]ACRIDINE (purity)	BCR-154	1
DIBENZ[a,c]ANTHRACENE (purity)	BCR-094	1
DIBENZ[a,j]ANTHRACENE (purity)	BCR-095	1
DIBENZ[c,h]ACRIDINE (purity)	BCR-156R	1
DIBENZO[a,e]FLUORANTHENE (purity)	BCR-265	1
DIBENZO[a,h]PYRENE (purity)	BCR-159	1
DIBENZO[a,e]PYRENE (purity)	BCR-133	1
DIBENZO[a,h]ANTHRACENE (purity)	BCR-138	1
DIBENZO[a,l]PYRENE (purity)	BCR-096	1
DIBENZO[b,d]FURAN (purity)	BCR-337	2
ELECTROLYTIC COPPER (trace elements)	BCR-074A, C	66
ELECTROLYTIC TOUGH PITCH COPPER (O)	BCR-022A, B	64
ELECTROLYTICALLY REFINED LEAD (trace elements)	BCR-286A, B	64
ENTEROBACTER CLOACAE (number of colony forming particles)	BCR-527	44
ENTEROCOCCUS FAECALIS (CIP 106877)	IRMM-355	46
ENTEROCOCCUS FAECIUM (number of colony forming particles)	BCR-506	43
ESCHERICHIA COLI (number of colony forming particles)	BCR-594	44
ESCHERICHIA COLI 0157 (NCTC 12900)	IRMM-351	46
ESTUARINE SEDIMENT	BCR-667	10
ESTUARINE SEDIMENT (Hg, methylmercury)	ERM-CC580	11, 19
ESTUARINE SEDIMENT (trace elements)	BCR-277R	10
ESTUARINE WATER (trace elements)	BCR-505	16
EUROSOIL (adsorption coefficients and pH)	IRMM-443-1	24
EUROSOIL (adsorption coefficients and pH)	IRMM-443-2	24
EUROSOIL (adsorption coefficients and pH)	IRMM-443-3	24
EUROSOIL (adsorption coefficients and pH)	IRMM-443-4	24
EUROSOIL (adsorption coefficients and pH)	IRMM-443-5	24
EUROSOIL (adsorption coefficients and pH)	IRMM-443-7	24
EWES/GOATS' CURD (for adulteration with cows' milk) 0 and 1 % cows' milk	BCR-599	48
FAUJASITE TYPE ZEOLITE (micropore volume and width)	BCR-704	60
Fe	IRMM-524	63
FISH OIL	ERM-BB350	33
FLAME COAL (S)	BCR-335	66
FLUORANTHENE (purity)	BCR-160R	1
FLY ASH (LOW LEVEL) (PCDDs and PCDFs)	BCR-615	22
FLY ASH (PCDDs and PCDFs)	BCR-490	22
FLY ASH (trace elements)	BCR-176R	12

FLY ASH FROM PULVERISED COAL (trace elements)	BCR-038	11
FLY ASH ON ARTIFICIAL FILTERS (surface density)	BCR-128	12
FORMALDEHYDE-2,4-DINITROPHENYLHYDRAZONE (purity)	BCR-546	49
FORMALDEHYDE-2,4-DINITROPHENYLHYDRAZONE on filter	BCR-553	50
FORMALDEHYDE-2,4-DINITROPHENYLHYDRAZONE on filter (blank)	BCR-554	50
FRESH WATER (nitrate, high level)	BCR-480	16
FRESH WATER (nitrate, low level)	BCR-479	16
FRESHWATER HARBOUR SEDIMENT (PAHs)	BCR-535	21
FRESHWATER HARBOUR SEDIMENT (PCBs)	BCR-536	21
FRESHWATER SEDIMENT (butyltin and phenyltin compounds)	BCR-646	19
FULL FAT SOYA (dietary fibre)	ERM-BC517	42
GAS OIL (0.0203 % S)	ERM-EF672	67
GAS OIL (0.0452 % S)	ERM-EF671	67
GAS OIL (0.1019 % S)	ERM-EF104	67
GAS OIL (0.363 % S)	BCR-105	67
GAS OIL (0.502 % S)	BCR-106	67
GAS OIL (1.040 % S)	BCR-107	67
GAS OIL (CFPP 6°C)	BCR-395	56
GAS OIL (Solvent Yellow 124)	ERM-EF317	67
GAS OIL (Solvent Yellow 124)	ERM-EF318	67
GENETICALLY MODIFIED 1507 MAIZE (blank)	ERM-BF418a	29
GENETICALLY MODIFIED 1507 MAIZE (level 1)	ERM-BF418b	29
GENETICALLY MODIFIED 1507 MAIZE (level 2)	ERM-BF418c	29
GENETICALLY MODIFIED 1507 MAIZE (level 3)	ERM-BF418d	29
GENETICALLY MODIFIED 281-24-236 X 3006-210-23 COTTON SEED (blank)	ERM-BF422a	30
GENETICALLY MODIFIED 281-24-236 X 3006-210-23 COTTON SEED (level 1)	ERM-BF422b	30
GENETICALLY MODIFIED 281-24-236 X 3006-210-23 COTTON SEED (level 2)	ERM-BF422c	30
GENETICALLY MODIFIED 281-24-236 X 3006-210-23 COTTON SEED (level 3)	ERM-BF422d	30
GENETICALLY MODIFIED 3272 MAIZE (blank)	ERM-BF420a	30
GENETICALLY MODIFIED 3272 MAIZE (level 1)	ERM-BF420b	30
GENETICALLY MODIFIED 3272 MAIZE (level 2)	ERM-BF420c	30
GENETICALLY MODIFIED 59122 MAIZE (blank)	ERM-BF424a	31
GENETICALLY MODIFIED 59122 MAIZE (level 1)	ERM-BF424b	31
GENETICALLY MODIFIED 59122 MAIZE (level 2)	ERM-BF424c	31
GENETICALLY MODIFIED 59122 MAIZE (level 3)	ERM-BF424d	31
GENETICALLY MODIFIED 98140 MAIZE (blank)	ERM-BF427a	32
GENETICALLY MODIFIED 98140 MAIZE (level 1)	ERM-BF427b	32
GENETICALLY MODIFIED 98140 MAIZE (level 2)	ERM-BF427c	32
GENETICALLY MODIFIED 98140 MAIZE (level 3)	ERM-BF427d	32
GENETICALLY MODIFIED Bt-11 MAIZE (blank)	ERM-BF412a	27
GENETICALLY MODIFIED Bt-11 MAIZE (level 1)	ERM-BF412b	27
GENETICALLY MODIFIED Bt-11 MAIZE (level 2)	ERM-BF412c	27
GENETICALLY MODIFIED Bt-11 MAIZE (level 3)	ERM-BF412d	27
GENETICALLY MODIFIED Bt-11 MAIZE (level 4)	ERM-BF412e	27
GENETICALLY MODIFIED Bt-11 MAIZE (level 5)	ERM-BF412f	27
GENETICALLY MODIFIED Bt-176 MAIZE (blank)	ERM-BF411a	27
GENETICALLY MODIFIED Bt-176 MAIZE (level 1)	ERM-BF411b	27
GENETICALLY MODIFIED Bt-176 MAIZE (level 2)	ERM-BF411c	27
GENETICALLY MODIFIED Bt-176 MAIZE (level 3)	ERM-BF411d	27
GENETICALLY MODIFIED Bt-176 MAIZE (level 4)	ERM-BF411e	27
GENETICALLY MODIFIED Bt-176 MAIZE (level 5)	ERM-BF411f	27
GENETICALLY MODIFIED EH92-527-1 POTATO (blank)	ERM-BF421a	30
GENETICALLY MODIFIED EH92-527-1 POTATO (level 1)	ERM-BF421b	30
GENETICALLY MODIFIED GA21 MAIZE (blank)	ERM-BF414a	28

GENETICALLY MODIFIED GA21 MAIZE (level 1)	ERM-BF414b	28
GENETICALLY MODIFIED GA21 MAIZE (level 2)	ERM-BF414c	28
GENETICALLY MODIFIED GA21 MAIZE (level 3)	ERM-BF414d	28
GENETICALLY MODIFIED GA21 MAIZE (level 4)	ERM-BF414e	28
GENETICALLY MODIFIED GA21 MAIZE (level 5)	ERM-BF414f	28
GENETICALLY MODIFIED GHB119 COTTON (blank)	ERM-BF428a	32
GENETICALLY MODIFIED GHB119 COTTON (level 1)	ERM-BF428b	32
GENETICALLY MODIFIED GHB119 COTTON (level 2)	ERM-BF428c	32
GENETICALLY MODIFIED H7-1 SUGAR BEET (blank)	ERM-BF419a	30
GENETICALLY MODIFIED H7-1 SUGAR BEET (level 1)	ERM-BF419b	30
GENETICALLY MODIFIED MIR604 MAIZE (blank)	ERM-BF423a	31
GENETICALLY MODIFIED MIR604 MAIZE (level 1)	ERM-BF423b	31
GENETICALLY MODIFIED MIR604 MAIZE (level 2)	ERM-BF423c	31
GENETICALLY MODIFIED MIR604 MAIZE (level 3)	ERM-BF423d	31
GENETICALLY MODIFIED MON 810 MAIZE (blank)	ERM-BF413a	28
GENETICALLY MODIFIED MON 810 MAIZE (level 1)	ERM-BF413b	28
GENETICALLY MODIFIED MON 810 MAIZE (level 2)	ERM-BF413c	28
GENETICALLY MODIFIED MON 810 MAIZE (level 3)	ERM-BF413d	28
GENETICALLY MODIFIED MON 810 MAIZE (level 4)	ERM-BF413e	28
GENETICALLY MODIFIED MON 810 MAIZE (level 5)	ERM-BF413f	28
GENETICALLY MODIFIED MON 863 MAIZE (blank)	ERM-BF416a	29
GENETICALLY MODIFIED MON 863 MAIZE (level 1)	ERM-BF416b	29
GENETICALLY MODIFIED MON 863 MAIZE (level 2)	ERM-BF416c	29
GENETICALLY MODIFIED MON 863 MAIZE (level 3)	ERM-BF416d	29
GENETICALLY MODIFIED MON 863 x MON 810 MAIZE (blank)	ERM-BF417a	29
GENETICALLY MODIFIED MON 863 x MON 810 MAIZE (level 1)	ERM-BF417b	29
GENETICALLY MODIFIED MON 863 x MON 810 MAIZE (level 2)	ERM-BF417c	29
GENETICALLY MODIFIED MON 863 x MON 810 MAIZE (level 3)	ERM-BF417d	29
GENETICALLY MODIFIED NK603 MAIZE (blank)	ERM-BF415a	29
GENETICALLY MODIFIED NK603 MAIZE (level 1)	ERM-BF415b	29
GENETICALLY MODIFIED NK603 MAIZE (level 2)	ERM-BF415c	29
GENETICALLY MODIFIED NK603 MAIZE (level 3)	ERM-BF415d	29
GENETICALLY MODIFIED NK603 MAIZE (level 4)	ERM-BF415e	29
GENETICALLY MODIFIED NK603 MAIZE (level 5)	ERM-BF415f	29
GENETICALLY MODIFIED ROUNDUP READY SOYA (blank)	ERM-BF410a	27
GENETICALLY MODIFIED ROUNDUP READY SOYA (level 1)	ERM-BF410b	27
GENETICALLY MODIFIED ROUNDUP READY SOYA (level 2)	ERM-BF410c	27
GENETICALLY MODIFIED ROUNDUP READY SOYA (level 3)	ERM-BF410dk	27
GENETICALLY MODIFIED ROUNDUP READY SOYA (level 4)	ERM-BF410e	27
GENETICALLY MODIFIED ROUNDUP READY SOYA (level 6)	ERM-BF410gk	27
GENETICALLY MODIFIED SOYA 305423 (blank)	ERM-BF426a	31
GENETICALLY MODIFIED SOYA 305423 (level 1)	ERM-BF426b	31
GENETICALLY MODIFIED SOYA 305423 (level 2)	ERM-BF426c	31
GENETICALLY MODIFIED SOYA 305423 (level 3)	ERM-BF426d	31
GENETICALLY MODIFIED SOYA 356043 (blank)	ERM-BF425a	31
GENETICALLY MODIFIED SOYA 356043 (level 1)	ERM-BF425b	31
GENETICALLY MODIFIED SOYA 356043 (level 2)	ERM-BF425c	31
GENETICALLY MODIFIED SOYA 356043 (level 3)	ERM-BF425d	31
GENETICALLY MODIFIED T304-40 COTTON (blank)	ERM-BF429a	32
GENETICALLY MODIFIED T304-40 COTTON (level 1)	ERM-BF429b	32
GENETICALLY MODIFIED T304-40 COTTON (level 2)	ERM-BF429b	32
Genomic DNA of Bacillus Licheniformis DSM 5749	IRMM-311	45
Genomic DNA of Bacillus Subtilis DSM 5750	IRMM-312	45
Genomic DNA of Campylobacter Jejuni	IRMM-448	46

Genomic DNA of Escherichia coli	IRMM-449	47
Genomic DNA of Listeria Monocytogenes	IRMM-447	46
GLASS (trace elements)	BCR-664	68
GLASS-CERAMIC	BCR-724A-E	56
GLUTARALDEHYDE-2,4-DINITROPHENYLHYDRAZONE (purity)	BCR-550	49
GLYCATED HAEMOGLOBIN HbA1c	IRMM/IFCC-466	54
GROUND WATER	ERM-CA615	17
GROUND WATER	ERM-CA616	17
GROUND WATER (Br, high level)	BCR-611	16
GROUND WATER (Br, low level)	BCR-612	16
GROUND WATER (trace elements, high level)	BCR-610	17
GROUND WATER (trace elements, low level)	BCR-609	17
HAEMOGLOBIN HbA0	IRMM/IFCC-467	54
HARICOTS BEANS (dietary fibre)	ERM-BC514	42
HARICOTS VERTS (major nutrients)	BCR-383	38, 41
HAY POWDER (elements)	BCR-129	13
HERRING (PCBs)	BCR-718	23
HIGH VOLATILE INDUSTRIAL COAL (S)	BCR-332	66
HIGH VOLATILE STEAM COAL (S)	BCR-336	66
HUMAN ADENOSINE DEAMINASE (ADA 1)	BCR-647	54
HUMAN APOLIPOPROTEIN A I (mass concentration)	BCR-393	52
HUMAN BLOOD (Pb, Cd)	BCR-634	52
HUMAN BLOOD (Pb, Cd)	BCR-635	52
HUMAN BLOOD (Pb, Cd)	BCR-636	52
HUMAN HAEMOLYSATE (glycated haemoglobin (HbA1c))	BCR-405 (RM)	53
HUMAN LACTATE DEHYDROGENASE ISOENZYME 1 (catalytic concentration)	ERM-AD453/IFCC	54
HUMAN PANCREATIC LIPASE (from pancreatic juice)	BCR-693	54
HUMAN PANCREATIC LIPASE (recombinant)	BCR-694	54
HUMAN PROSTATIC ACID PHOSPHATASE (catalytic concentration)	BCR-410	54
HUMAN SERUM (17 $\beta$ -ESTRADIOL, high level)	BCR-578	51
HUMAN SERUM (17 $\beta$ -ESTRADIOL, low level)	BCR-576	51
HUMAN SERUM (17 $\beta$ -ESTRADIOL, medium level)	BCR-577	51
HUMAN SERUM (Al, Se, Zn)	BCR-637	52
HUMAN SERUM (Al, Se, Zn)	BCR-638	52
HUMAN SERUM (Al, Se, Zn)	BCR-639	52
HUMAN SERUM (Ca, Mg, Li)	BCR-304	52
HUMAN SERUM (cortisol spiked)	ERM-DA193	51
HUMAN SERUM (cortisol unspiked)	ERM-DA192	51
HUMAN SERUM (CRP)	ERM-DA472/IFCC	53
HUMAN SERUM (cystatin C)	ERM-DA471/IFCC	53
HUMAN SERUM (high creatinine)	BCR-575	54
HUMAN SERUM (high progesterone)	BCR-348R	51
HUMAN SERUM (low creatinine)	BCR-573	54
HUMAN SERUM (medium creatinine)	BCR-574	54
HUMAN SERUM (progesterone)	ERM-DA347	51
HUMAN SERUM (proteins)	ERM-DA470k/IFCC	53
HUMAN THYROGLOBULIN (Tg) (mass concentration)	BCR-457	53
INDENO[1,2,3-cd]FLUORANTHENE (purity)	BCR-267	1
INDUSTRIAL CLAY SOIL (PCDDs, PCDFs)	BCR-530	21
INDUSTRIAL SANDY SOIL (PCDDs, PCDFs)	BCR-529	21
INDUSTRIAL SOIL (PAHs)	BCR-524	20
INDUSTRIAL SOIL (PCBs)	BCR-481	21
IRON (natural) spike, chloride solution	IRMM-634	72
IRON, isotopic, metal wires (50 mg) / metal cubes (250 mg)	IRMM-014	71

IRON-57 spike, chloride solution	IRMM-620	72
ISOCTANE (purity)	IRMM-442	61, 67
ISOTOPE RATIOS IN ABSOLUTE ALCOHOL	BCR-656	24, 70
ISOTOPE RATIOS IN ALCOHOLIC SOLUTION	BCR-660	25, 70
ISOTOPE RATIOS IN GLUCOSE	BCR-657	25, 70
ISOTOPE RATIOS IN SYNTHETIC WINE	BCR-658	25, 70
ISOTOPE RATIOS IN SYNTHETIC WINE	BCR-659	25, 70
LAKE SEDIMENT (trace elements)	BCR-280R	10
LAKE SEDIMENT (trace elements)	BCR-701	19
LATEX SPHERES (particle diameter 2 microns)	BCR-165	50
LATEX SPHERES (particle diameter 4.8 microns)	BCR-166	50
LATEX SPHERES (particle diameter 9.6 microns)	BCR-167	50
LEAD GLASS (composition/refractive index)	BCR-126A	63
LEAD WITH ADDED IMPURITIES (trace elements)	BCR-288A, B	64
LEMNA MINOR (aquatic plant)	BCR-670	14
LICHEN (trace elements)	BCR-482	14
LIGHT SANDY SOIL (trace elements)	BCR-142R	9
LIMESTONE POWDERS (for shear testing)	BCR-116	57
LINDE TYPE A ZEOLITE (micropore volume and width)	BCR-705	60
LISTERIA MONOCYTOGENES (number of colony forming particles)	BCR-595	45
LITHIUM CARBONATE, isotopic, solid	IRMM-015	71
LITHIUM CARBONATE, isotopic, solid	IRMM-016	71
LITHIUM-6 spike, chloride solution	IRMM-615	72
LOAM SOIL	ERM-CC141	9
LOW VOLATILE STEAM COAL (S)	BCR-331	66
LUNG TISSUE (asbestos fibres)	BCR-665	55
LUNG TISSUE (asbestos fibres)	BCR-666	55
MAGNESIUM (natural) spike, nitrate solution	ERM-AE637	72
MAGNESIUM-26 spike, nitrate solution	ERM-AE638	72
MAIZE	ERM-BC716	36
MAIZE	ERM-BC717	36
MAIZE FLOUR (deoxynivalenol blank)	BCR-377	35
MARGARINE (vitamins)	BCR-122	40
MERCURY (natural) spike, chloride solution	ERM-AE639	72
MERCURY-202 spike, chloride solution	ERM-AE640	73
Mg, isotopic, nitrate solution	IRMM-009	71
MICROCRYSTALLINE CELLULOSE (water content above saturated solutions)	BCR-302	60
MILK POWDER (oxytetracycline)	BCR-493	48
MILK POWDER (oxytetracycline) (blank)	BCR-492	48
MILK POWDER (PCDDs, PCDFs)	BCR-607	34
MIXED VEGETABLES (vitamins)	BCR-485	40
MOROCCAN PHOSPHATE ROCK (trace elements)	BCR-032	62, 68
MULLITE (lattice spacing, other parameters)	BCR-301 (RM)	59
MUSSEL (dc-saxitoxin)	BCR-543	36
MUSSEL TISSUE	BCR-668	15
MUSSEL TISSUE	BCR-682	23
MUSSEL TISSUE (butyltins)	ERM-CE477	20
MUSSEL TISSUE (trace elements)	ERM-CE278	15
NATURAL MILK POWDER (PCBs )	BCR-450	33
NATURAL MILK POWDER (pesticides)	BCR-187	34
NATURAL PORK FAT (blank)	ERM-BB444	33
Nb	IRMM-525	63
Nb	IRMM-526	63
n-HEPTANE (purity)	IRMM-441	61, 67

Ni	IRMM-521	63
NICKEL (N, O)	BCR-099	64
NIMONIC 75 FOR CREEP TESTING	BCR-425	58
NIMONIC 75 FOR TENSILE PROPERTIES	BCR-661	58
NIVALENOL in acetonitrile	IRMM-316	26
OPAL GLASS (spectral reflectance)	BCR-406A	61
ORGANIC-RICH SOIL (extractable elements)	BCR-700	18
OXIDE GLASS (15 ppm U)	IRMM-540R	69
OXIDE GLASS (50 ppm U)	IRMM-541	69
PCB STANDARD SOLUTION	BCR-365	2
PEANUT BUTTER (aflatoxins low level)	BCR-385R	35
PEANUT BUTTER (aflatoxins very low level)	BCR-401R	35
Peanut Test Material Kit	IRMM-481	48
PET bottle material	BCR-712	42
PETROL	ERM-EF211	67
PHARMACEUTICAL GLASS	IRMM-435	55
PICENE (purity)	BCR-168	1
PIG FEED (nutritional properties)	BCR-709	42
PIG KIDNEY (CTC free)	BCR-706	48
PIG KIDNEY (CTC incurred)	BCR-707	48
PIG LIVER (CTC free)	BCR-695	48
PIG LIVER (CTC incurred)	BCR-696	48
PIG LIVER (vitamins)	BCR-487	40
PIG MUSCLE (CTC free)	BCR-697	48
PIG MUSCLE (CTC incurred)	BCR-698	48
PLANKTON (trace elements)	BCR-414	13
Plasmid DNA	IRMM/IFCC-490	55
Plasmid DNA	IRMM/IFCC-491	55
Plasmid DNA	IRMM/IFCC-492	55
PLASMID DNA FRAGMENTS OF MON 810 MAIZE	ERM-AD413	28
PLASTIC FILM (OVERALL MIGRATION IN OLIVE OIL (film A)	BCR-537	42
PLASTIC FILM (OVERALL MIGRATION IN OLIVE OIL (film B)	BCR-538	42
PLASTIC FILM (OVERALL MIGRATION IN OLIVE OIL (film C)	BCR-539	42
PLASTIC FILM E	BCR-593	42
PLATINUM, isotopic, metal	IRMM-010	71
POLYCHLORODIBENZO-P-DIOXINS (PCDD) AND POLYCHLORODIBENZOFURANS (PCDFS)	BCR-614	3
POLYETHYLENE (40, 75, 200, 400 mg/kg Cd)	VDA 001-004	69
POLYETHYLENE (high level)	ERM-EC681k	69
POLYETHYLENE (LDPE)	ERM-EC590	69
POLYETHYLENE (low level)	ERM-EC680k	69
POLYPROPYLENE (PP)	ERM-EC591	69
PORCINE MUSCLE (chloramphenicol blank)	BCR-444	47
PORCINE MUSCLE (chloramphenicol positive)	BCR-445	47
PORK FAT (organochlorine pesticides)	BCR-430	34
PORK MUSCLE	ERM-BB124	48
PORK MUSCLE	ERM-BB130	47
PORK MUSCLE	ERM-BB384	38, 41
POTASSIUM CHLORIDE FERTILIZER (elemental composition)	BCR-113	62
POTASSIUM SULPHATE FERTILIZER (elemental composition)	BCR-114	62
PROSTATE SPECIFIC ANTIGEN (protein mass)	BCR-613	53
PURIFIED HUMAN ALFAFOETOPROTEIN (protein mass)	BCR-486	53
PYRENE (purity)	BCR-177R	1
PYREX GLASS (thermal conductivity)	BCR-039B, C	56
QUARTZ (1.20 - 20.00 microns)	BCR-070	59

QUARTZ (2.50 m <sup>2</sup> /g) (nitrogen BET specific surface area)	BCR-172	59
QUARTZ (particle size 0.35 - 3.50 microns)	BCR-066	59
QUARTZ (particle size 14 - 90 microns)	BCR-069	59
QUARTZ (particle size 1400 - 5000 microns)	BCR-132	59
QUARTZ (particle size 160 - 630 microns)	BCR-068	59
QUARTZ (particle size 2.40 - 32.00 microns)	BCR-067	59
QUARTZ (particle size 480 - 1800 microns)	BCR-131	59
QUARTZ (particle size 50 - 220 microns)	BCR-130	59
RAPESEED (colza) (S, total glucosinolate, high level)	ERM-BC367	35
RAPESEED (colza) (S, total glucosinolate, low level)	ERM-BC366	35
RAPESEED (colza) (S, total glucosinolate, medium level)	ERM-BC190	35
RAPESEED (oil, moisture, volatiles)	BCR-446	41
RAPESEED (oil, moisture, volatiles)	BCR-447	41
RAPESEED (oil, moisture, volatiles)	BCR-448	41
REFINED PURE LEAD (O)	BCR-055	64
RESIN-BONDED FIBRE BOARD (thermal conductivity)	IRMM-440	56
Rh	IRMM-529	63
RICE FLOUR	IRMM-804	37
RICE FLOUR (amylose, high level)	BCR-467	40
RICE FLOUR (amylose, low level)	BCR-465	40
RICE FLOUR (amylose, medium level)	BCR-466	40
RIVER SEDIMENT (extractable phosphorous)	BCR-684	18
ROAD DUST (trace elements)	BCR-723	12
RUBIDIUM (natural) spike, nitrate solution	IRMM-619	72
RUBIDIUM-87 spike, nitrate solution	IRMM-618	72
RYE FLOUR	ERM-BC381	38, 41
RYE GRASS	ERM-CD281	13
SALMON TISSUE	BCR-725	48
SALMONELLA ENTERITIDIS (NCTC 12694)	IRMM-352	46
SALMONELLA TYPHIMURIUM (number of colony forming particles)	BCR-507R	44
SAXITOXIN IN ACETIC ACID	BCR-663	25
SCRATCH TESTING	BCR-692	58
SEA LETTUCE (ulva-lactuca) (trace elements)	BCR-279	14
SEWAGE SLUDGE (Cr)	BCR-597	11
SEWAGE SLUDGE (industrial origin) (trace elements)	BCR-146R	11
SEWAGE SLUDGE (mixed origin) (trace elements)	BCR-145R	11
SEWAGE SLUDGE (PCDDs and PCDFs)	BCR-677	22
SEWAGE SLUDGE AMENDED (terra rossa) SOIL (trace elements)	BCR-484	18
SEWAGE SLUDGE AMENDED SOIL (trace elements)	BCR-143R	9
SEWAGE SLUDGE AMENDED SOIL (trace elements)	BCR-483	18
SILICON DIOXIDE, isotopic, solid	IRMM-018a	71
SILICON, isotopic, Si single crystal	IRMM-017	71
SIMULATED RAINWATER (major components)	ERM-CA408	16
SIMULATED RAINWATER (major components)	BCR-409	16
SINGLE CELL PROTEIN (major elements)	BCR-273	37
SINGLE CELL PROTEIN (trace elements)	BCR-274	37
SiO <sub>2</sub> /Si (10,20,30 nm)	BCR-564	60
SKIM MILK POWDER	BCR-685	41
SKIM MILK POWDER (major and trace elements)	BCR-063R	15
SOYA-MAIZE OIL BLEND (fatty acid profile)	BCR-162R	38
SPIKED MILK POWDER (pesticides)	BCR-188	34
SPIKED PORK FAT (low level)	ERM-BB446	33
SPIKED PORK FAT (very low level)	ERM-BB445	33
SPIKED SKIM MILK POWDER (trace elements)	BCR-150	36

SPIKED SKIM MILK POWDER (trace elements)	BCR-151	36
STEAM COAL (elements, ash, gross calorific value)	BCR-182	57, 66
STRONTIUM-84 spike, nitrate solution	IRMM-635	72
SULPHUR-32 spike, nitrate solution	IRMM-643	73
SULPHUR-32 spike, nitrate solution	IRMM-644	73
SULPHUR-32 spike, nitrate solution	IRMM-645	73
SULPHUR-34 spike, nitrate solution	IRMM-646	73
SUPERPHOSPHATE (various parameters)	BCR-033	62
TANTALUM PENTOXIDE ON TANTALUM FOIL	BCR-261T	60
TETRAMETHYLUREA	STA-003k	25
THALLIUM (natural) spike, nitrate solution	ERM-AE649	73
THERMALLY REFINED LEAD (trace elements)	BCR-287A, B	64
THROMBOPLASTIN BOVINE (OBT/79) (prothrombin time)	ERM-AD148	55
THROMBOPLASTIN RABBIT (prothrombin time)	ERM-AD149	55
THYROXINE (T4)	IRMM-468	50
Ti	IRMM-531	63
Ti 6AL 4V ALLOY (O)	BCR-059A, B	64
TiAl6V4 (Al, V)	BCR-089	65
TIN ORE CONCENTRATE (Sn)	BCR-010	62
TITANIA (8.23 m <sup>2</sup> /g) (nitrogen BET specific surface area)	BCR-173	59
TITANIUM (H)	BCR-318	64
TITANIUM (impurities)	BCR-090A, B	65
TITANIUM (O, N)	BCR-024B, C	64
TOASTED BREAD	ERM-BD273	49
TOMATO PASTE COLOUR REFERENCE TILE (colour values)	BCR-400	61
TRACE ELEMENTS IN WHITE CABBAGE	BCR-679	37
TRIPHENYLENE (purity)	BCR-270	1
TUNA FISH (total and methylmercury)	ERM-CE464	15, 20
TUNA FISH (total and methylmercury)	BCR-463	15, 20
TUNA FISH TISSUE (As species)	BCR-627	20
TUNGSTEN (0.18 m <sup>2</sup> /g) (nitrogen BET specific surface area)	BCR-175	59
TUNGSTEN CARBIDE POWDER (O)	BCR-102	64
UNALLOYED ZINC (disc) (trace elements)	BCR-326	64
UNALLOYED ZINC (disc) (trace elements)	BCR-327	64
UNALLOYED ZINC (trace elements)	ERM-EB322	64
UNALLOYED ZINC (trace elements)	ERM-EB323	64
UNALLOYED ZINC (trace elements)	ERM-EB324	64
UNALLOYED ZINC (trace elements)	ERM-EB325	64
UNALLOYED ZINC (trace elements)	BCR-321	64
URBAN DUST (trimethyllead)	BCR-605	19
UREA FERTILIZER (composition)	BCR-179	62
WASTE MINERAL OIL (high PCB level)	BCR-449	23
WASTE MINERAL OIL (low PCB level)	BCR-420	23
WASTEWATER (effluent)	BCR-713	17
WELDING DUST LOADED ON FILTER (Cr VI, Cr)	BCR-545	20
WHEAT (ochratoxin A, blank)	BCR-471	36
WHEAT FLOUR	ERM-BC382	38, 41
WHEAT FLOUR (deoxynivalenol blank)	BCR-396	35
WHITE CLOVER (trace elements)	BCR-402	13
WHOLE MILK POWDER (aflatoxin M1, high level)	ERM-BD284	35
WHOLE MILK POWDER (aflatoxin M1, low level)	ERM-BD283	35
WHOLE MILK POWDER (aflatoxin M1, zero level)	ERM-BD282	35
WHOLE MILK POWDER (major nutrients)	BCR-380R	41
WHOLEMEAL FLOUR (vitamins)	BCR-121	40

WINE (EtOH, low level)	BCR-653	41
ZEARALENONE IN ACETONITRILE	ERM-AC699	25
ZINC ORE CONCENTRATE (trace elements)	BCR-109	68
ZINC ORE CONCENTRATE (trace elements)	BCR-110	68
ZINC-64 spike, nitrate solution	IRMM-651	73
ZINC-64 spike, nitrate solution	IRMM-652	73
ZINC-64 spike, nitrate solution	IRMM-3702	73
Zinc-64, nitrate solution	IRMM-007/1-6	71
ZINC-67 spike, nitrate solution	IRMM-653	73
ZINC-68 spike, nitrate solution	IRMM-654	73
ZIRCALOY (C, N, O)	BCR-275	64
ZIRCALOY (C, N, O)	BCR-276	64
ZIRCALOY-4 (trace element impurities)	BCR-098	65
ZnAl4 (trace elements)	BCR-351	65
ZnAl4 (trace elements)	BCR-352	65
ZnAl4 (trace elements)	BCR-353	65
ZnAl4 (trace elements)	BCR-354	65
ZnAl4 (trace elements)	BCR-355	65
ZnAl4Cu1 (trace elements)	BCR-356	65
ZnAl4Cu1 (trace elements)	BCR-357	65
ZnAl4Cu1 (trace elements)	BCR-358	65
ZnAl4Cu1 (trace elements)	BCR-359	65
ZnAl4Cu1 (trace elements)	BCR-360	65
ZnAl4Cu1 (trace elements)	BCR-361	65