



# Reference Material Catalogue

SUMMER 2021





## Our Branding

The National Measurement Laboratory (NML) Reference Materials are currently sold under two brands; ERM and LGC. LGC's certified reference materials were branded on release as ERM products between 2006 and 2017. ERM was a joint project between LGC, BAM (<https://www.bam.de>) and JRC (<https://ec.europa.eu/jrc>) which is no longer active. All materials released since summer 2017 have been branded as LGC products.

## Disclaimer

*While reasonable care has been taken in the preparation of this document, the author does not assume responsibility for errors or omissions in the information contained herein.*

*Please contact LGC Standards for more information before purchase at [uksales@lgcgroup.com](mailto:uksales@lgcgroup.com)*

## Our UKAS Accreditation

Many of our reference materials and methods of producing them are within our scope for United Kingdom Accreditation Service (UKAS) accreditation, either for reference material production (accredited to ISO 17034:2016) and/or for our calibration methods (accredited to ISO/IEC 17025:2017).

This accreditation provides independent evidence that the reference materials at the NML have been prepared according to best practice. Accredited reference materials display the National Accreditation Symbol alongside them. Questions regarding accreditation for specific reference materials can be sent to [measurement@lgcgroup.com](mailto:measurement@lgcgroup.com).



The UK's National Measurement Laboratory (for chemical and bio-measurement) at LGC produces reference materials (RMs) used worldwide. Our portfolio of 150 RMs includes accredited, certified, and quality control materials.

## Reference Material

As defined in ISO Guide 30:2015, 2.1.1

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

## Certified Reference Material

As defined in ISO Guide 30:2015, 2.1.2

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

## Quality Control Material

A material which can be used for demonstrating that a measurement system is under statistical control, performs as expected and provides reliable results; it is a material where the trueness of the measurement result is not critical as long as it is consistent

The National Measurement Laboratory (NML) for chemical and bio-measurement, hosted at LGC, plays a leading role internationally to develop best practice and standardise measurements.

Our science supports manufacture and trade, protects consumers, furthers skills development and enhances quality of life.

Serving as the UK's Designated Institute for chemical and bio-measurement, we provide expert advice to government, industry, healthcare (NHS), academia and supports the work of the Government Chemist.

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# Clinical

## Blood & Serum Material

ERM-DA110	Human blood - tacrolimus
ERM-DA111	Human blood - sirolimus
ERM-DA200	Frozen human serum - digoxin, high level
ERM-DA201	Frozen human serum - digoxin, low level
ERM-DA250	Frozen human serum
ERM-DA251	Frozen human serum
ERM-DA252	Frozen human serum
ERM-DA253	Frozen human serum
ERM-DA345a	Frozen human serum - testosterone, high level
ERM-DA346	Frozen human serum - testosterone, low level
LGC8211	Frozen human serum - elements and selenomethionine
LGC8276	Blood – Hip replacement wear metals – Cr and Co

## Clinical Purity Material

ERM-AC021	Sirolimus
ERM-AC022	Tacrolimus
ERM-AC200	Digoxin

## Forensic Ethanol Material

ERM-AC510	Aqueous ethanol – 50 mg/ 100 ml
ERM-AC511	Aqueous ethanol – 67 mg / 100 ml
LGC5401	Aqueous ethanol – 80 mg/ 100 ml
LGC5402	Aqueous ethanol – 107 mg/ 100 ml
LGC5403	Aqueous ethanol – 200 mg/ 100 ml
LGC5409	Aqueous ethanol – 20 mg/ 100 ml

# Environment

## Ash Material

LGC6180	Pulverised fuel ash
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## Carbon Isotope Ratio Material

ERM-AE672	Glycine - absolute carbon isotope ratio
LGC171-KT	Glycine solutions - absolute carbon isotope ratio

## Drinking Water Material

LGC6026	Hard drinking water - metals
ERM-CA016	Soft drinking water - anions
LGC6027	Soft drinking water - metals
LGC6028	Hard drinking water - low level metals

## Environment Purity Material

ERM-AC820	3,3',4,4' -tetrachlorobiphenyl (PCB77)
ERM-AC821	3,3' ,4,4' ,5-pentachlorobiphenyl (PCB 126)
ERM-AC822	3,3' ,4,4' ,5,5' -hexachlorobiphenyl (PCB 169)
ERM-AC823	Polychlorinated biphenyls in 2,2,4 -Trimethylpentane (iso-octane)
LGC1801	Nicotine

## Fresh Water

LGC6019	River water - trace metals
LGC6020	River water - anions
LGC6025	River water - anions

# Environment

## Miscellaneous Water Materials

LGC6016	Estuarine water
LGC6177	Landfill leachate - metals

## Sediment Materials

LGC6187	River sediment
LGC6188	River sediment - PAHs
LGC6189	River sediment - extractable metals

## Sewage Sludge Materials

ERM-CC136	Sewage sludge - metals
LGC6181	Sewage sludge - extractable metals
LGC6182	Sewage sludge - PAHs
LGC6184	Sewage sludge - PCBs

## Soil Materials

ERM-CC135	Contaminated brickworks soil
LGC6115	Contaminated soil PCBs and PAHs
LGC6145	Contaminated clay loam soil - extractable metal, PAHs and inorganics
LGCQC3013	Loamy sand soil 2 - total petroleum hydrocarbons

# Food & Beverage

## Alcohol Solutions

LGC5404	Reference spirit - 5 % ABV
LGC5405	Reference spirit – 15% ABV
LGC5412	Reference spirit - 40 % ABV
ERM-AC406	Reference spirit - 40 % ABV
LGC5407	Reference spirit - 70 % ABV
ERM-BA001	Wine - nominal 5 % ABV
ERM-BA002	Wine - nominal 10 % ABV
ERM-BA003	Wine - nominal 15 % ABV
ERM-BA005	Lager - 5 % ABV
LGC5000	Brandy - 40 % ABV
LGC5004	Lager shandy
LGC5100	Whisky - congeners

## Drink Products

ERM-BD011	Orange juice - 1 °Brix
ERM-BD013	Orange juice - 20 °Brix
ERM-BD014	Orange juice - 55 °Brix
LGC7113	Fruit Squash – Total SO <sub>2</sub>
LGC7140	Soft drink with colours

## Fish and Fish Products

LGC7164	Crab paste
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## Food & Beverage Purity Materials

ERM-AC301	Butylated hydroxyanisole
ERM-AC303	Leucomalachite green
LGC1110	<i>pp'</i> -DDE
LGC1205	Malathion
LGC7300	Butylated hydroxytoluene
LGC7302	Saccharin
LGC7305	Potassium sorbate
LGC7330	Selenomethionine



# Food & Beverage

## Fruit and Vegetable Products

LGC7162	Strawberry leaves
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## Meat and Meat Products

LGC7220	Horsemeat
LGC7221	Beef
LGC7222	Pork
LGC7223	Sheep meat
LGC7224	Chicken meat
LGC7225	Turkey meat
LGC7226	Goat meat
LGC7240	1 % w/w horsemeat in beef (nominal)
LGC7242	1 % w/w pork in beef (nominal)
LGC7244	1 % w/w chicken meat in sheep meat (nominal)
LGC7246	1 % w/w turkey meat in sheep meat (nominal)
LGC7248	1 % w/w beef in sheep meat (nominal)

## Processed Food Products

ERM-BC210	Wheat flour - selenium and selenomethionine
ERM-BD016	Sugar confectionery - sugars
LGC7016	Chocolate confectionery
LGC7103	Sweet digestive biscuit
LGCQC101-KT	Chocolate mousse dessert - peanut protein
LGCQC1020	Peanut flour
LGC7155	Processed meat - Proximates, chloride, hydroxyproline & metals
LGC7421	Allergen reference material - Skimmed milk powder
LGC7422	Allergen reference material - Egg white powder
LGC7424	Allergen reference material - Almond powder
LGC7425	Allergen reference material - Hazelnut powder – partially defatted
LGC7426	Allergen reference material - Walnut powder – partially defatted
LGC746-KT	Allergen kit – Milk, Egg, Almond, Hazelnut and Walnut

## Animal Feeding Stuffs

LGC7173	Poultry feed – proximates and elements
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# Industrial

## Elemental Analysis Materials

LGC4001	Dibenzothiophene
LGC4002	Acetanilide
LGC4003	Benzoic acid
LGC4008	4-Bromobenzoic acid
LGC4009	2-Iodobenzoic acid

## Enthalpy of Fusion Materials

LGC2601	Indium
LGC2603	Naphthalene
LGC2604	Benzil
LGC2605	Acetanilide
LGC2606	Benzoic acid
LGC2607	Diphenylacetic acid
LGC2608	Lead
LGC2609	Tin
LGC2610	Biphenyl
LGC2611	Zinc
LGC2612	Aluminium
LGC2613	Phenyl salicylate

## Flash Point Materials

ERM-FC032	n-Nonane
ERM-FC033	n-Decane

## Gypsum Materials

LGC2700	Natural gypsum
LGC2701	Natural anhydrite
LGC2702	Blended gypsum
LGC2703	Desulfurised gypsum

# Industrial

## Melting Point Materials

ERM-FC021	Carbazole
ERM-FC022	2-Chloroanthraquinone
ERM-FC023	Anisic acid
ERM-FC024	Diphenylacetic acid
ERM-FC025	Benzoic acid
ERM-FC026	Acetanilide
ERM-FC027	Benzil
ERM-FC028	Naphthalene
ERM-FC029	4-Nitrotoluene
ERM-FC030	Phenyl salicylate

# Miscellaneous materials

ERM-AC316	Solvent yellow 124
ERM-EF212	Petrol - sulfur
ERM-DZ002	Electronic cigarette liquid - nicotine & water
LGCQC5050	Colloidal gold nanoparticle - nominal diameter 30 nm

# Clinical

## Blood and Serum Materials

### Human blood - tacrolimus ERM-DA110

Batch: a

Unit size: 1 mL

Certified values:

Tacrolimus:

7.41 ± 0.25 µg/kg

Additional material info:

Tacrolimus:

7.82 ± 0.25 µg/L

The material was prepared by Analytical Services International (London, UK) by spiking blank pooled human whole blood with a standard solution of tacrolimus to give a nominal concentration of 8 µg/kg tacrolimus in blood.

Characterisation was carried out at LGC using exact matching isotopic dilution mass spectrometry.

This material is intended for use in the calibration of instruments, the validation of new methods, and monitoring the performance of methods commonly used in clinical laboratories to determine the tacrolimus content of human blood samples.



4005

### Human blood - sirolimus ERM-DA111

Batch: a

Unit size: 1 mL

Certified values:

Sirolimus

9.24 ± 0.52 µg/kg

Additional material info:

Sirolimus:

9.73 ± 0.55 µg/L

Homogeneity and stability studies have been carried out and an inter-laboratory study of commutability was conducted following the principles of CLSI document EP30-A.

The intended use of this material is for the calibration of instruments and the validation, quality control and performance monitoring of methods to determine sirolimus in human blood. This material will help support laboratories, secondary standards producers and assay developers ensure compliance with ISO15189.



4005

### Frozen human serum - digoxin, high level ERM-DA200

Batch: a

Unit size: 1 mL

Certified values:

Digoxin: 2.08 ± 0.15 µg/kg

Additional material info:

Digoxin: 2.74 ± 0.19 nmol/L

Digoxin: 2.14 ± 0.15 µg/L

Human serum from donors was supplied by Scipac (Sittingbourne, UK), and prepared by Cardiff Bioanalytical Services Ltd.

This material is intended for the validation of new and existing methods, and monitoring the performance of methods, commonly used in clinical laboratories to determine the digoxin content of human serum samples. It can also be used in the training and evaluation of staff. The material is clinically relevant since it closely matches the upper decision level for digoxin monitoring



4005

**Frozen human serum - digoxin, low level ERM-DA201**

Batch: a  
Unit size: 1 mL  
Certified values:  
Digoxin:  
0.845 ± 0.050 µg/kg

Additional material info:  
Digoxin: 1.110 ± 0.065 nmol/L  
Digoxin: 0.868 ± 0.051 µg/L

Human serum from donors was supplied by Scipac (Sittingbourne, UK), and prepared by Cardiff Bioanalytical Services Ltd.

This material is intended for use in the validation of new and existing methods, and monitoring the performance of methods, commonly used in clinical laboratories to determine the digoxin content of human serum samples. It can also be used in the training and evaluation of staff. The material is clinically relevant since it closely matches the lower decision level for digoxin monitoring



4005

**Frozen human serum ERM-DA250**

Batch: a  
Unit size: 1 mL

Human blood serum was obtained from donors at the University Hospital of Wales.

This material is intended for use in the validation and on-going monitoring of methods of analysis for the determination of creatinine and electrolytes in human blood samples.



4005

**Certified values:**

Creatinine	39.0 ± 2 mg/kg	Magnesium	47 ± 3 mg/kg
Calcium	123 ± 5 mg/kg	Potassium	277 ± 14 mg/kg
Lithium	6.6 ± 0.4 mg/kg	Sodium	3370 ± 160 mg/kg

**Frozen human serum ERM-DA251**

Batch: a  
Unit size: 1 mL

Human blood serum was obtained from donors at the University Hospital of Wales.

This material is intended for use in the validation and on-going monitoring of methods of analysis for the determination of creatinine and electrolytes in human blood samples.



4005

**Certified values:**

Creatinine	22 ± 2 mg/kg	Magnesium	19 ± 2 mg/kg
Calcium	71 ± 3 mg/kg	Potassium	136 ± 7 mg/kg
Lithium	4.5 ± 0.3 mg/kg	Sodium	2740 ± 80 mg/kg

**Frozen human serum  
ERM-DA252**

Batch: a  
Unit size: 1 mL  
Certified values:  
Creatinine:  
3.1 ± 0.5 mg/kg

Human blood serum was obtained from donors at the University Hospital of Wales.

This material is intended for use in the validation and ongoing monitoring of methods of analysis for the determination of creatinine in human blood samples.



4005

**Additional material information:**

Calcium	58 mg/kg	Potassium	67 mg/kg
Lithium	1.3 mg/kg	Sodium	2400 mg/kg
Magnesium	8.1 mg/kg		

**Frozen human serum  
ERM-DA253**

Batch: a  
Unit size: 1 mL  
Certified values:  
Creatinine:  
50 ± 2 mg/kg

Human blood serum was obtained from donors at the University Hospital of Wales.

This material is intended for use in the validation and ongoing monitoring of methods of analysis for the determination of creatinine in human blood samples.



4005

**Frozen human serum –  
testosterone, high level  
ERM-DA345a**

Batch: a  
Unit size: 0.8 mL  
Certified values:  
Testosterone:  
5.39 ± 0.16 µg/kg

Time-expired human blood serum from female donors was spiked with testosterone to bring the concentration within the normal range for male human serum.

This material is intended for use in the validation and ongoing monitoring of methods of analysis for the determination of testosterone in human blood samples.



4005

**Frozen human serum –  
testosterone, low level  
ERM-DA346**

Batch: a  
Unit size: 0.8 mL  
Certified values:  
Testosterone:  
0.25 ± 0.04 µg/kg

Time-expired human blood serum from female donors was used with a concentration within the normal range for female human serum.

This material is intended for use in the validation and ongoing monitoring of methods of analysis for the determination of testosterone in human blood samples.



4005

**Frozen human serum –  
elements and  
selenomethionine  
LGC8211**

Batch: 1  
Unit size: 1.1 mL

Human serum from a single donor was prepared from blood obtained at the Royal Surrey County Hospital (Guildford, UK).

This material is intended for the validation of new and existing methods, and monitoring the performance of methods, commonly used in clinical laboratories to determine the importance of trace elements copper, selenium and zinc in human serum samples.



4005

Certified values:			
Copper	1130 ± 33 µg/kg	Selenium	64.1 ± 3.0 µg/kg
Zinc	658 ± 33 µg/kg	Selenomethionine	25.0 ± 1.6 µg/kg
Iron	496 ± 22 µg/kg		

Additional material data:			
Copper	18.18 ± 0.53 µmol/L	Selenium	0.830 ± 0.038 µmol/L
Zinc	10.30 ± 0.52 µmol/L	Selenomethionine	0.1304 ± 0.0086 µmol/L
Iron	18.18 ± 0.53 µmol/L		

**Blood – Hip replacement  
wear metals – Cr and Co  
LGC8276**

Batch: 1  
Unit size: 1.8 mL  
Indicative Values:  
Molybdenum 9 µg/kg  
Nickel 5 µg/kg  
Titanium 10 µg/kg

The material was prepared by the UK's Trace Elements External Quality Assessment Scheme (TEQAS), (Guildford, UK) by adding the elements of interest to equine blood containing EDTA at a concentration of 1 mg/mL.

This material is intended for use in the calibration of instruments and the validation of new methods commonly used in clinical laboratories to determine the metal content of human blood samples.



4005

Certified values:	
Constituent	Concentration (µg/kg)
Chromium	6.69 ± 0.28
Cobalt	6.78 ± 0.20



## Clinical Purity Material

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### **Sirolimus ERM-AC021**

Batch: a  
Unit size: 0.1 g  
Certified values:  
Purity:  
98.89 ± 0.64 % mass

This material was produced from a batch of sirolimus donated by the supplier. It was dispensed into 0.1 g portions. The purity was assessed by combining data from HPLC-UV, Karl Fischer and TGA.

This material is intended for use in the calibration of instruments, quality control and the validation of methods to determine the immunosuppressant drug sirolimus. It can also be used in the training and evaluation of staff.



4005

### **Tacrolimus ERM-AC022**

Batch: a  
Unit size: 0.1 g  
Certified values:  
Purity:  
97.65 ± 0.68 % mass

This material was produced from a batch of tacrolimus monohydrate in powder from kindly donated by Sandoz International GmbH.

Portions of at least 100 mg were dispensed into 1.25 mL amber glass Vials with PTFE lined screw caps, and sealed in plastic bags containing desiccant.

This material is intended for use in the calibration of instruments, quality control and the validation of methods to determine the immunosuppressant drug tacrolimus. It can also be used in the training and evaluation of staff.



4005

### **Digoxin ERM-AC200**

Batch: a  
Unit size: 0.5 g  
Certified values:  
Purity:  
98.0 ± 0.5 % mass

A batch of digoxin was obtained from a commercial supplier of reagents. The purity was assessed by combining data from HPLC-UV, Karl Fischer, ICP-OES and GC/MS.

This material is intended for use in the validation and calibration and monitoring of methods to determine digoxin content. It can be used in the training and evaluation of staff.



4005

## Forensic Ethanol Material

### ERM-AC510 Aqueous ethanol - 50 mg/ 100 mL

Batch: a  
Unit Size: 25 mL  
Certified Value:  
Ethanol content:  
49.6 ± 0.6 mg/100 mL

This material, produced by LGC is a solution of ethanol in water at a nominal concentration of 50 mg/100 mL.

This material is primarily intended for use as a reference material for the calibration and validation of methods for the determination of ethanol in biological fluids.



4005



0423

### ERM-AC511 Aqueous ethanol - 67 mg/ 100 mL

Batch: a  
Unit size: 25 mL  
Certified value:  
Ethanol content:  
66.9 ± 0.6 mg/100 mL

This material, produced by LGC is a solution of ethanol in water at a nominal concentration of 67 mg/100 mL.

This material is primarily intended for use as a reference material for the calibration and validation of methods for the determination of ethanol in biological fluids.



4005



0423

### LGC5401 Aqueous ethanol - 80 mg/ 100 mL

Batch: 39  
Unit size: 25 mL  
Certified value:  
Ethanol content:  
80.1 ± 0.6 mg/100 mL

This material, produced by LGC, is a solution of ethanol in water at a nominal concentration of 80 mg/100 mL.

This material is primarily intended for use as a reference material for the calibration and validation of methods for the determination of ethanol in biological fluids.



4005



0423

### LGC5402 Aqueous ethanol - 107 mg/ 100 mL

Batch: 26  
Unit size: 25 mL  
Certified value:  
Ethanol content:  
106.9 ± 0.6 mg/100 mL

This material, produced by LGC, is a solution of ethanol in water at a nominal concentration of 107 mg/100 mL.

This material is primarily intended for use as a reference material for the calibration and validation of methods for the determination of ethanol in biological fluids.



4005



0423

### LGC5403 Aqueous ethanol - 200 mg/ 100 mL

Batch: 24  
Unit size: 25 mL  
Certified value:  
Ethanol content:  
199.8 ± 0.7 mg/100 mL

This material, produced by LGC, is a solution of ethanol in water at a nominal concentration of 200 mg/100 mL.

This material is primarily intended for use as a reference material for the calibration and validation of methods for the determination of ethanol in biological fluids.



4005



0423

**LGC5409**  
**Aqueous ethanol - 20 mg/  
100 mL**

Batch: 3  
Unit size: 25 mL  
Certified value:  
Ethanol content:  
20.1 ± 0.6 mg/100 mL

This is a solution of ethanol in water at a nominal concentration of 20 mg/100 mL

This material is primarily intended for use as a Reference material for the calibration and validation of methods for the determination of ethanol in biological fluids.



**4005**



**0423**

# Environment

## Ash Materials

### Pulverised fuel ash LGC6180



4005

Batch: 1  
Unit size: 50 g

This material was obtained from a disposal site near Carmarthen Bay in South Wales, UK. Pulverised fuel ash is a waste product of coal-fired power stations.

This material is intended for use in development, validation or quality control of analytical methods for the determination of the extractable metal content in ash based material.

The extractable metal content refers to metals soluble in aqua regia using methods based on ISO 11466:1995.

Assessed values: Extractable metal content			
Aluminium	25700 ± 6300 mg/kg	Magnesium	3660 ± 440 mg/kg
Arsenic	91.7 ± 14.1 mg/kg	Manganese	259 ± 40 mg/kg
Barium	676 ± 92 mg/kg	Nickel	48.4 ± 12.5 mg/kg
Calcium	6415 ± 530 mg/kg	Potassium	6170 ± 1680 mg/kg
Chromium	43.8 ± 11.7 mg/kg	Sodium	1230 ± 480 mg/kg
Cobalt	18.5 ± 4.3 mg/kg	Vanadium	105 ± 15 mg/kg
Copper	67.9 ± 11.2 mg/kg	Zinc	115 ± 21 mg/kg
Lead	48.6 ± 11.3 mg/kg		

Indicative values: Extractable metal content			
Antimony	12 mg/kg	Lithium	46 mg/kg
Beryllium	2.3 mg/kg	Mercury	0.5 mg/kg
Boron	25 mg/kg	Selenium	2 mg/kg
Iron	32900 mg/kg	Titanium	610 mg/kg

Total metal content			
Aluminium	13100 mg/kg	Magnesium	8500 mg/kg
Antimony	16 mg/kg	Manganese	410 mg/kg
Arsenic	100 mg/kg	Molybdenum	5 mg/kg
Barium	1300 mg/kg	Nickel	110 mg/kg
Beryllium	6 mg/kg	Potassium	29600 mg/kg
Calcium	9200 mg/kg	Selenium	3 mg/kg
Chromium	140 mg/kg	Sodium	5100 mg/kg
Cobalt	41 mg/kg	Tin	7 mg/kg
Copper	130 mg/kg	Titanium	4400 mg/kg
Iron	52400 mg/kg	Vanadium	260 mg/kg
Lead	110 mg/kg	Zinc	260 mg/kg
Lithium	130 mg/kg		

## Carbon Isotope Ratios

### Glycine – absolute carbon isotope ratio ERM-AE672

Batch: a

Unit size: 0.5 g

Certified value:

$$n(^{13}\text{C})/n(^{12}\text{C})$$

Certified value (ratio): 0.010648

Uncertainty (ratio): 0.000031

Additional material data:

$\delta^{13}\text{C}_{\text{VPDB-LSVEC}}$ :

- 42.12 ± 0.42 (‰)

The material was prepared from a single batch of commercially available high purity glycine and dispensed as ≥ 0.5 g units in 4 mL amber screw top vials.

This material is intended for use in the calibration of instruments, the validation of new methods and the monitoring of the performance of methods used for the determination of carbon isotope ratios. It can also be used for the training and evaluation of staff.



4005

### Glycine solution– absolute carbon isotope ratio LGC171-KT

Batch: 1

Unit size: 0.5 g

The material was prepared from a single batch of commercially available high purity glycine.

This material is intended for use in the calibration of instruments, the validation of new methods and the monitoring of the performance of methods used for the determination of carbon isotope ratios. It can also be used for the training and evaluation of staff.



4005

Certified Values:	
$n(^{13}\text{C})/n(^{12}\text{C})$ ratio for:	
LGC1711	0.010642±0.000030
LGC1712	0.010821±0.000030
LGC1713	0.011227±0.000032

Indicative Values:		
	$\delta^{13}\text{C}_{\text{VPDB-LSVEC}}$ (‰)	Uncertainty (‰)
LGC1711	-42.22	0.34
LGC1712	-24.66	0.24
LGC1713	+12.55	0.22

## Drinking Water Material

### Hard drinking water UK- metals LGC6026



4005

Batch: 003  
Unit size: 250 mL

Hard drinking water was sourced from Lichfield (Staffordshire, UK) potable mains supply. The water was filtered through a set of 8 µm, 1.2 µm and 0.45 µm in-line filter and acidified to approximately 0.1% nitric acid and pH <2.0.

This material is primarily intended for use in development, validation or quality control of analytical methods for the determination of elements in hard drinking water. The material may also be applicable to other similar matrices where more closely matched reference materials are not available.

Certified values:			
Aluminium	199.9 ± 6.1 µg/L	Lithium	11.24 ± 0.58 µg/L
Antimony	4.99 ± 0.17 µg/L	Magnesium	18.50 ± 0.76 mg/L
Arsenic	10.00 ± 0.31 µg/L	Manganese	48.4 ± 1.5 µg/L
Barium	116.1 ± 3.5 µg/L	Molybdenum	4.77 ± 0.25 µg/L
Beryllium	5.08 ± 0.26 µg/L	Nickel	19.00 ± 0.72 µg/L
Boron	983 ± 26 µg/L	Potassium	5.30 ± 0.15 mg/L
Cadmium	4.98 ± 0.15 µg/L	Selenium	10.19 ± 0.59 µg/L
Calcium	77.1 ± 2.2 mg/L	Sodium	24.60 ± 0.79 mg/L
Chromium	50.0 ± 1.9 µg/L	Strontium	491 ± 20 µg/L
Cobalt	4.88 ± 0.17 µg/L	Thallium	5.11 ± 0.42 µg/L
Copper	2017 ± 56 µg/L	Uranium	4.95 ± 0.40 µg/L
Iron	198.4 ± 5.5 µg/L	Vanadium	4.96 ± 0.15 µg/L
Lead	9.98 ± 0.14 µg/L	Zinc	621 ± 19 µg/L

### Soft drinking water UK- anions ERM-CA016

Batch: a  
Unit size: 250 mL  
Certified value:  
Chloride: 250 ± 7 mg/L  
Nitrate: 48 ± 3 mg/L  
Fluoride: 1.5 ± 0.1 mg/L  
Sulfate: 254 ± 10 mg/L

Indicative value:  
Ammonium: 0.48 mg/L

A supply of tap water (Plymouth, UK) was collected, and copper sulfate was added as a biocide at a final concentration of 1 mg/L (as copper). The water was then filtered through 1 µm cellulose filters. The base levels of the analytes were measured and high purity salts were added gravimetrically to achieve anion concentrations in the water approximating to the maximum permissible levels specified in EU/UK drinking water regulations (EC directive 98/83/EC).

This material is intended for use in validating methods and for confirming instrument calibration for anions in drinking water.



4005

**Soft drinking water –  
metals  
LGC6027**

Soft drinking water was sourced from the Bury (Lancashire, UK) potable mains supply.

This material is intended for use in development, validation or quality control of analytical methods for the determination of metals in soft drinking water.



4005

Batch: 1  
Unit size: 250 mL

Certified values:			
Aluminium	196.1 µg/L	Manganese	49.9 µg/L
Antimony	5.21 µg/L	Molybdenum	4.62 µg/L
Arsenic	10.00 µg/L	Nickel	20.01 µg/L
Barium	115.7 µg/L	Selenium	10.21 µg/L
Beryllium	5.09 µg/L	Strontium	496 µg/L
Boron	1006 µg/L	Thallium	4.88 µg/L
Cadmium	5.09 µg/L	Uranium	4.95 µg/L
Chromium	49.9 µg/L	Vanadium	4.93 µg/L
Cobalt	4.87 µg/L	Zinc	613 µg/L
Copper	1995 µg/L	Calcium	8.53 µg/L
Iron	200.0 µg/L	Magnesium	1.026 µg/L
Lead	10.15 µg/L	Potassium	0.367 µg/L
Lithium	10.41 µg/L	Sodium	4.36 µg/L

**Hard drinking water –  
metals  
LGC6028**

Hard drinking water was sourced from the Tamworth (Staffordshire, UK) potable mains supply.

This reference material is primarily intended for use in the development, validation or quality control of analytical methods for the determination of metals in hard drinking water. The material may also be applicable to other similar matrices where more closely matched reference materials are not available.



4005

Batch: 1  
Unit size: 250 mL

Certified values			
Aluminium	20.1 µg/L	Molybdenum	2.20 µg/L
Antimony	5.02 µg/L	Nickel	4.85 µg/L
Arsenic	4.98 µg/L	Selenium	5.13 µg/L
Barium	92.8 µg/L	Strontium	193.8 µg/L
Beryllium	2.05 µg/L	Thallium	4.98 µg/L
Boron	76.2 µg/L	Uranium	4.90 µg/L
Cadmium	0.970 µg/L	Vanadium	1.908 µg/L
Chromium	9.76 µg/L	Zinc	58.2 µg/L
Cobalt	4.66 µg/L	Calcium	79.6 mg/L
Copper	36.0 µg/L	Magnesium	13.30 mg/L
Lead	1.033 µg/L	Potassium	4.91 mg/L
Lithium	10.44 µg/L	Sodium	23.47 mg/L
Manganese	4.74 µg/L		

## Environment Purity Materials

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**3,3',4,4' –  
tetrachlorobiphenyl  
(PCB77)**

**ERM-AC820**

Batch: a

Unit size: 0.02 g

Certified value:

Purity:

99.8 + 0.2/- 0.3 mass %

A batch of PCB 77 was obtained from a commercial supplier.

This material is primarily intended as a calibration standard in methods of analysis of PCB 77 in environmental and other relevant matrices.



**4005**

**3,3',4,4',5 –  
pentachlorobiphenyl  
(PCB 126)**

**ERM-AC821**

Batch: a

Unit size: 0.02 g

Certified value:

Purity:

98.9 ± 0.3 mass %

A batch of PCB 126 was obtained from a commercial supplier.

This material is primarily intended as a calibration standard in methods of analysis of PCB 126 in environmental and other relevant matrices.



**4005**

**3,3',4,4',5,5' –  
hexachlorobiphenyl  
(PCB 169)**

**ERM-AC822**

Batch: a

Unit size: 0.02 g

Certified value:

Purity:

99.4 + 0.6/- 1.3 mass %

A batch of PCB 169 was obtained from a commercial supplier.

This material is primarily intended as a calibration standard in methods of analysis of PCB 169 in environmental and other relevant matrices.



**4005**



**Polychlorinated biphenyls in  
2,2,4-trimethylpentane  
(iso-octane)  
ERM-AC823**



**4005**

Batch: a

Unit size: 1.2 mL

This material was prepared by a commercial manufacturer to a specification produced by LGC. High purity PCB (polychlorinated biphenyl) standards were combined gravimetrically to produce a solution containing 15 PCB congeners in 2,2,4-trimethylpentane (iso-octane). The solution was divided into 1.2 mL portions sealed in amber glass ampoules.

This material is intended for method validation purposes and for checking instrument calibration for the measurement of polychlorinated biphenyls.

**Certified values**

<u>Parameter</u>	<u>Concentration</u>
2,4, 4' – trichlorobiphenyl (PCB28)	703±15 (µg/kg)
2,2', 5,5' – tetrachlorobiphenyl (PCB52)	706±7 (µg/kg)
2,2',4,5,5' –pentachlorobiphenyl (PCB101)	696±7 (µg/kg)
2,3',4,4',5 –pentachlorobiphenyl (PCB 118)	712±9 (µg/kg)
2,2',3,4,4',5' –hexachlorobiphenyl (PCB138)	678±37 (µg/kg)
2,2', 4,4', 5,5' –hexachlorobiphenyl (PCB153)	702±8 (µg/kg)
2,2',3,4,4',5,5' –heptachlorobiphenyl (PCB180)	700±9 (µg/kg)

**Indicative Values<sup>1</sup>**

<u>Parameter</u>	<u>Concentration</u>
2,4',5-trichlorobiphenyl (PCB31)	697 (µg/kg)
3,3',4,4'-tetrachlorobiphenyl (PCB77)	697 (µg/kg)
2,3,3',4',6-pentachlorobiphenyl (PCB110)	690 (µg/kg)
2,2',3,4',5',6-hexachlorobiphenyl (PCB149)	695 (µg/kg)
2,3,3',4',5,6-hexachlorobiphenyl (PCB163)	689 (µg/kg)
2,2',3,3',4,4',5-heptachlorobiphenyl (PCB170)	693 (µg/kg)
2,2',3,4',5,5',6-heptachlorobiphenyl (PCB187)	693 (µg/kg)
2,2',3,3',4,4',5,5'-octachlorobiphenyl (PCB194)	693 (µg/kg)

**Nicotine  
LGC1801**

Batch: 4

Unit size: 0.6 mL

Certified value:

Purity:

99.57 ± 0.32 mass %

This material is intended for use in checking the analytical procedures applied in the analysis of tobacco smoke condensate and of pesticide residues and formulations.



**4005**

## Fresh Water

### River water trace metals LGC6019



4005

Collected from the River Thames downstream of Henley-on-Thames at Aston, U.K. Filtered at 0.7 µm and then at 0.45 µm. Stabilised at pH 2 by the addition of concentrated HNO<sub>3</sub>.

This material is intended for use in development, validation or quality control of analytical methods for the determination of elements in river waters

Certified values			
Aluminium	73 ± 13 µg/L	Lead	5.2 ± 0.3 µg/L
Calcium	109 ± 3 mg/L	Potassium	4.78 ± 0.12 mg/L
Cadmium	0.11 ± 0.02 µg/L	Magnesium	4.62 ± 0.12 mg/L
Chromium	0.78 ± 0.20 µg/L	Sodium	24.7 ± 0.5 mg/L
Copper	15.4 ± 1.5 µg/L	Zinc	59.7 ± 2.5 µg/L
Iron	287 ± 7 µg/L		

Batch: 1

Unit size: 250 mL

### River water – anions LGC6020

Batch: 2

Unit size: 250 mL

Certified value:

Chloride: 33.1 ± 1.2 mg/L

Fluoride:

0.273 ± 0.023 mg/L

Nitrate: 28.2 ± 1.2 mg/L

Sulfate: 82.8 ± 2.4 mg/L

Additional value:

Phosphate:

0.003-0.300mg/L

(Range of inter-laboratory results)

Collected from Menethorpe Beck, Yorkshire, UK. A soluble copper salt solution was added (as a biocide) to provide a copper concentration of 2.7 mg/L. The levels of phosphate and fluoride were adjusted by spiking the base material with high purity salts to achieve the target concentrations. The solution was thoroughly mixed and filtered sequentially through 8 µm, 1.2 µm and 0.45 µm membrane filters and 250 mL aliquots were sub-sampled into tamper evident screw-cap amber glass bottles.



4005

This material is intended for use in development, validation or quality control of analytical methods for the determination of anions in river waters.

**River water – anions  
LGC6025**

Batch: 1

Unit size: 250 mL

Certified value:

Chloride:  $31.3 \pm 1.3$  mg/L  
Fluoride:  $1.248 \pm 0.074$  mg/L  
Nitrate:  $38.0 \pm 1.6$  mg/L  
Sulfate:  $66.2 \pm 1.8$  mg/L

Additional value:

Phosphate:  
0.08-1.61 mg/L  
(Range of inter-laboratory results)

Collected from Menethorpe Beck, Yorkshire, UK, the water was filtered sequentially through 8.0  $\mu\text{m}$  and 0.2  $\mu\text{m}$  membrane filters before the addition of a soluble copper salt solution (as a biocide) to provide a copper concentration of 1 mg/L.

The levels of phosphate and fluoride were adjusted by spiking the base material with high purity salts to achieve the target concentrations. This material is intended for use in development, validation or quality control of analytical methods for the determination of anions in river waters.



4005

## Miscellaneous Water Materials

### Estuarine water trace metals LGC6016



4005

Batch: 1  
Unit size: 50 mL

Collected from the Severn Estuary, UK, offshore from a heavily industrialised area near Avonmouth.

This material is intended for use in development, validation or quality control of analytical methods for the determination of metals in estuarine water.

Certified values			
Cadmium	101 ± 2 µg/kg	Manganese	976 ± 31 µg/kg
Copper	190 ± 4 µg/kg	Nickel	186 ± 3 µg/kg
Lead	196 ± 3 µg/kg		

Indicative values			
Calcium	220 mg/L	Sodium	4700 mg/L
Magnesium	570 mg/L	Zinc	55 µg/L
Potassium	180 mg/L		

### Landfill leachate – trace metals LGC6177



4005

Batch: 1  
Unit size: 50 mL

Reference material collected from a landfill site in Loughborough Leicestershire, UK.

This material is intended for use in development, validation or quality control of analytical methods for the determination of metals in landfill leachate. This material may also be applicable to other matrices where more closely matched reference materials are not available.

Assessed values			
Boron	9.8 ± 0.5 mg/L	Manganese	0.14 ± 0.02 mg/L
Calcium	74.8 ± 1.7 mg/L	Nickel	0.21 ± 0.02 mg/L
Chromium	0.18 ± 0.02 mg/L	Phosphorus	11.5 ± 1.5 mg/L
Iron	3.8 ± 0.2 mg/L	Potassium	780 ± 14 mg/L
Manganese	73.5 ± 2.7 mg/L	Sodium	1750 ± 29 mg/L

## Sediment Materials

### River sediment LGC6187



4005

Batch: 1

Unit size: 80 g

Indication value:

Weight Loss on ignition:  
12 g/100 g

River sediment obtained from a monitoring station lagoon on the River Elbe close to the Czech-German border.

This material is intended for use in the development, validation or quality control of analytical methods for the determination of extractable metals in river sediment. The material may also be applicable to other matrices where more closely matched reference materials are not available.

Certified value:			
Arsenic	24.0 ± 3.2 mg/kg	Mercury	1.4 ± 0.1 mg/kg
Cadmium	2.7 ± 0.3 mg/kg	Nickel	34.7 ± 1.7 mg/kg
Chromium	84.0 ± 9.4 mg/kg	Selenium	1.2 ± 0.2 mg/kg
Copper	83.6 ± 4.1 mg/kg	Tin	6.8 ± 1.8 mg/kg
Iron	23600 ± 1500 mg/kg	Vanadium	38.3 ± 6.5 mg/kg
Lead	77.2 ± 4.5 mg/kg	Zinc	439 ± 26 mg/kg
Manganese	1240 ± 60 mg/kg		

### River sediment – PAHs LGC6188



4005

Batch: 1

Unit size: 30 g

Indicative values:

Acenaphthylene 0.05 mg/kg  
Acenaphthene 0.03 mg/kg  
Fluorene 0.05 mg/kg  
Indeno[1,2,3-*cd*]pyrene 0.4 mg/kg  
Naphthalene 0.2 mg/kg

Weight loss on drying:  
2.0 g/100 g

River sediment was taken from a monitoring station lagoon on the river Elbe close to the Czech- German border.

This material is intended for use in development, validation or quality control of analytical methods for the determination of polyaromatic hydrocarbons (PAHs) in sediments.

Assessed values:	
Phenanthrene	0.74 ± 0.29 mg/kg
Anthracene	0.231 ± 0.081 mg/kg
Fluoranthene	1.52 ± 0.32 mg/kg
Pyrene	1.24 ± 0.50 mg/kg
Chrysene	0.63 ± 0.16 mg/kg
Benzo[ <i>a</i> ]anthracene	0.60 ± 0.19 mg/kg
Benzo[ <i>b</i> ]fluoranthene	0.68 ± 0.18 mg/kg
Benzo[ <i>k</i> ]fluoranthene	0.323 ± 0.084 mg/kg
Benzo[ <i>a</i> ]pyrene	0.51 ± 0.16 mg/kg
Dibenzo[ <i>a,h</i> ]anthracene	0.86 ± 0.023 mg/kg
Benzo[ <i>ghi</i> ]perylene	0.35 ± 0.12 mg/kg

**River sediment –  
extractable metals  
LGC6189**

Batch: 1

Unit Size: 30 g

A river sediment was taken from a monitoring station lagoon on the river Elbe, in the Czech Republic, close to the Czech-German border.

This material is intended for use as a reference material in the development, validation or quality control of analytical methods for the determination of extractable metals in sediments.

<b>Assessed Values:</b>	
Arsenic	26 ± 2 mg/kg
Cadmium	3.3 ± 0.5 mg/kg
Chromium	93 ± 8 mg/kg
Copper	87 ± 8 mg/kg
Manganese	1120 ± 60 mg/kg
Molybdenum	1.2 ± 0.1 mg/kg
Nickel	34 ± 3 mg/kg
Lead	87 ± 6 mg/kg
Zinc	460 ± 30 mg/kg

## Sewage Sludge Material

### Sewage sludge—metals ERM-CC136



4005

Batch: a  
Unit size: 25 g

Aged sewage sludge collected from a disused sewage works site at Heathrow in London, UK. Dried, sterilised and ground to a powder. The extractable metal content refers to metals soluble in aqua regia using methods based on ISO 11466:1995.

This material is intended for use as a reference material in the development, validation or quality control of analytical methods for the determination of extractable metals in sewage sludge.

#### Assessed values:

Aluminium	15100 ± 5400 mg/kg	Magnesium	2820 ± 540 mg/kg
Barium	633 ± 195 mg/kg	Manganese	544 ± 32 mg/kg
Chromium	399 ± 32 mg/kg	Nickel	130 ± 10 mg/kg
Cobalt	23.2 ± 3.6 mg/kg	Potassium	2030 ± 844 mg/kg
Copper	464 ± 21 mg/kg	Sodium	397 ± 64 mg/kg
Iron	22200 ± 2780 mg/kg	Zinc	890 ± 140 mg/kg
Lead	341 ± 18 mg/kg		

### Sewage sludge – extractable metals LGC6181



4005

Batch: 1  
Unit size: 100 g

This material is a digested sewage sludge of mixed origin which was taken from a city water treatment plant immediately after discharge from a digestion tank.

This material is intended for use in development, validation or quality control of analytical methods for the determination of extractable metals in sewage sludge.

The extractable metal content refers to metals soluble in hot Aqua Regia using methods based on ISO 11466:1995.

#### Certified values:

Arsenic	7.8 ± 0.9 mg/kg	Manganese	454 ± 23 mg/kg
Cadmium	5.8 ± 0.3 mg/kg	Mercury	4.9 ± 0.4 mg/kg
Chromium	78 ± 8 mg/kg	Nickel	45 ± 3 mg/kg
Copper	354 ± 18 mg/kg	Silver	55 ± 5 mg/kg
Iron	40300 ± 2300 mg/kg	Vanadium	20 ± 2 mg/kg
Lead	105 ± 8 mg/kg	Zinc	1100 ± 50 mg/kg

**Sewage sludge – PAHs  
LGC6182**



**4005**

Batch: 1  
Unit size: 30 g

Indicative values

Acenaphthylene: 0.4 mg/kg  
Dibenzo(a,h)anthracene: 0.09 mg/kg  
Acenaphthene 0.09 mg/kg  
Benzo[k]fluoranthene 0.3 mg/kg  
Phenanthrene 0.8 mg/kg

Digested sewage sludge of mixed origin was taken from a city water treatment plant immediately after discharge from a digestion tank.

This material is intended for use in development, validation or quality control of analytical methods for the determination of PAHs in sewage sludge.

Assessed values:			
Naphthalene	0.20 ± 0.13 mg/kg	Benzo[a]anthracene	0.56 ± 0.21 mg/kg
Fluorene	0.159 ± 0.068 mg/kg	Benzo[b]fluoranthene	0.71 ± 0.14 mg/kg
Anthracene	0.162 ± 0.067 mg/kg	Benzo[a]pyrene	0.406 ± 0.087 mg/kg
Fluoranthene	1.35 ± 0.26 mg/kg	Indeno[1,2,3-cd]pyrene	0.36 ± 0.15 mg/kg
Pyrene	1.26 ± 0.43 mg/kg	Benzo[ghi]perylene	0.46 ± 0.27 mg/kg
Chrysene	0.76 ± 0.18 mg/kg		

**Sewage sludge – PCBs  
LGC6184**



**4005**

Batch: 1  
Unit size: 30 g

Digested sewage sludge of mixed origin, taken from a city water treatment plant in the Czech Republic, immediately after discharge from a digestion tank.

This material is intended for use in development, validation or quality control of analytical methods for the determination of polychlorinated biphenyls in sewage sludge.

Certified values:	
PCB 101	37 ± 3 µg/kg
PCB 118	17 ± 2 µg/kg
PCB 153	112 ± 8 µg/kg



## Soil Material

### Contaminated brick works soil ERM-CC135



4005

Batch: a  
Unit size: 50 g

This material is a contaminated soil that was obtained from a brickworks site in Hackney, London.

This material is intended for use as a reference material in the development, validation or quality control of analytical methods for the determination of extractable metals and total metals in soils.

The extractable metal content refers to metals soluble in aqua regia using methods based on ISO11466 (1995).

Certified values:			
Aluminium	22700 ± 4600 mg/kg	Potassium	5100 ± 920 mg/kg
Barium	134 ± 10 mg/kg	Magnesium	7000 ± 580 mg/kg
Beryllium	1.4 ± 0.4 mg/kg	Manganese	348 ± 18 mg/kg
Calcium	21900 ± 520 mg/kg	Sodium	362 ± 44 mg/kg
Cobalt	20 ± 4 mg/kg	Nickel	277 ± 13 mg/kg
Chromium	336 ± 28 mg/kg	Lead	391 ± 16 mg/kg
Copper	105 ± 5 mg/kg	Selenium	0.9 ± 0.3 mg/kg
Iron	40900 ± 2700 mg/kg	Vanadium	78 ± 11 mg/kg
Mercury	3.2 ± 0.4 mg/kg	Zinc	316 ± 41 mg/kg

Additional material information	
Lithium	20 mg/kg
Molybdenum	20 mg/kg
Tin	35 mg/kg
Titanium	200 mg/kg

Total metal content	
Aluminium	50000 mg/kg
Beryllium	2 mg/kg
Cobalt	28 mg/kg
Lithium	54 mg/kg
Molybdenum	26 mg/kg
Tin	37 mg/kg
Titanium	3400 mg/kg
Selenium	1 mg/kg

**Contaminated soil –  
PCBs and PAHs  
LGC6115**



**4005**

Batch: 1  
Unit size: 50 g

This material was sourced and prepared under contract by an experienced Commercial laboratory.

This material is intended for use in validating methods for the determination of PCBs and PAHs in soil materials.

**Certified Values:**

PCB101	93 ± 7 µg/kg	Benzoanthracene	36 ± 1 mg/kg
PCB118	116 ± 4 µg/kg	Benzopyrene	13 ± 0.02 mg/kg
Phenanthrene	178 ± 6 mg/kg	Benzoperylene	0.33 ± 0.06 mg/kg
Fluoranthene	312 ± 7 mg/kg		

**Contaminated clay loam soil –  
extractable metals, PAHs and  
inorganics  
LGC6145**



**4005**

Batch: 1  
Unit size: 50 g

This material was blended from two soils, sourced from the Czech Republic and one soil sourced from the UK.

This material is intended for use in validating methods for the determination of metals in soil materials.

The extractable metal content refers to metals soluble in aqua regia using methods based on ISO 11466:1995.

**Certified values:**

*Extractable Metal Content*

Arsenic	38.7 ± 1.2 mg/kg	Nickel	39.0 ± 2.5 mg/kg
Cadmium	0.65 ± 0.07 mg/kg	Selenium	1.81 ± 0.13 mg/kg
Chromium	47.6 ± 1.8 mg/kg	Vanadium	53.9 ± 2.3 mg/kg
Copper	62.2 ± 3.6 mg/kg	Zinc	137 ± 6 mg/kg
Lead	45.1 ± 2.3 mg/kg		

**Assessed values:**

Phenanthrene	325 ± 26 mg/kg
Chrysene	45 ± 9 mg/kg
Benzo[ <i>b</i> ]fluoranthene	12 ± 3 mg/kg
Indeno[1,2,3- <i>cd</i> ]pyrene	0.97 ± 0.28 mg/kg
Water soluble chloride	65 ± 9 mg/kg
Water soluble sulfate	5.3 ± 0.7 g/L

**Loamy sand soil 2 – total  
petroleum hydrocarbons  
LGCQC3013**

Batch: 1  
Unit size: 100 g  
Indicative value:  
TPH(C<sub>10</sub> – C<sub>40</sub>) 4100 mg/kg

This material was prepared from a soil sample obtained from a contaminated electricity sub-station site in the UK.

This material is intended for use as a quality control material for analytical methods used in the investigation of soil for TPH contamination.

**Textural classification- loamy sand**

Sand 2.00 – 0.063 mm	87 % m/m	Clay <0.002 mm	7 % m/m
Silt 0.063 – 0.002 mm	6 % m/m		

# Food & Beverage

## Alcohol Solutions

### Reference spirit - 5 % ABV

**LGC5404**

Batch: 21

Unit size: 25 mL

Certified values:

Alcohol strength:  
5.02 ± 0.04 % ABV

Density:  
989.98 ± 0.04 kg/m<sup>3</sup>

A suitable supply of ethanol was obtained, checked for purity and diluted with water to produce a solution with a nominal ethanol concentration of 5 % ABV.

The primary use of this reference material is for checking the calibration of automatic density meters commonly used in industry to determine alcoholic strength, and for checking analyst and method performance.



4005

### Reference spirit - 15 % ABV

**ABV**

**LGC5405**

Batch: 12

Unit size: 25 mL

Certified values:

Alcohol strength:  
14.99 ± 0.04 % ABV

Density:  
977.93 ± 0.05 kg/m<sup>3</sup>

A suitable supply of ethanol was obtained, checked for purity and diluted volumetrically with water to produce a solution with a nominal ethanol concentration of 15% alcohol by volume.

The primary use of this reference material is for checking the calibration of automatic density meters commonly used in industry to determine alcoholic strength, and for checking analyst and method performance.



4005

### Reference spirit - 40 % ABV

**ERM-AC406**

Batch: g

Unit size: 25 mL

Certified values:

Alcohol strength:  
40.07 ± 0.04 % ABV

Density:  
946.87 ± 0.06 kg/m<sup>3</sup>

A suitable supply of ethanol was obtained, diluted volumetrically with water to produce a solution with a nominal ethanol concentration of 40 % ABV.

The primary use of this reference material is for checking the calibration of automatic density meters commonly used in industry to determine alcoholic strength, and for checking analyst and method performance.



4005

**Reference spirit -  
40% ABV  
LGC5412**

Batch: a  
Unit size: 50 mL  
Certified values:  
Alcohol strength:  
40.08 ± 0.04 % ABV  
Density:  
946.86 ± 0.06 kg/m<sup>3</sup>

A suitable supply of ethanol was obtained, diluted volumetrically with water to produce a solution with a nominal ethanol concentration of 40 % ABV.

The primary use of this reference material is for checking the calibration of automatic density meters commonly used in industry to determine alcoholic strength, and for checking analyst and method performance.



4005

**Reference spirit -  
70 % ABV  
LGC5407**

Batch: d  
Unit size: 25 mL  
Certified values:  
Alcohol strength:  
70.09 ± 0.03 % ABV  
Density (in air) :  
884.27 ± 0.07 kg/m<sup>3</sup>

A suitable supply of ethanol was obtained, diluted volumetrically with water to produce a solution with a nominal ethanol concentration of 70 % ABV.

The primary use of this reference material is for checking the calibration of automatic density meters commonly used in industry to determine alcoholic strength, and for checking analyst and method performance.



4005

**Wine - nominal  
5 % ABV  
ERM-BA001**

Batch: a  
Unit size: 250 mL  
Certified values:  
Alcohol: 5.37 ± 0.05 %  
(at 20 °C)

A suitable supply of wine was obtained from a commercial source.  
The wine was stabilised with the addition of sodium metabisulfite and citric acid and thoroughly mixed.

This material is intended for use as a reference material for the validation of methods for the determination of alcohol content in alcoholic beverages.



4005

**Wine - nominal 10 % ABV  
ERM-BA002**

Batch: a  
Unit size: 250 mL  
Certified values:  
Alcohol: 10.12 ± 0.04 %  
(at 20 °C)

A suitable supply of wine was obtained from a commercial source. The wine was stabilised with the addition of sodium metabisulfite and citric acid and thoroughly mixed.

This material is intended for use as a reference material for the validation of methods for the determination of alcohol content in alcoholic beverages.



4005

**Wine - nominal 15 % ABV  
ERM-BA003**

Batch: a  
Unit size: 250 mL  
Certified values:  
Alcohol: 14.47 ± 0.10 % (at 20 °C)

A suitable supply of wine was obtained from a commercial source. The wine was stabilised with the addition of sodium metabisulfite and citric acid and thoroughly mixed.

This material is intended for use as a reference material for the validation of methods for the determination of alcohol content in alcoholic beverages.



4005

**Lager - 5 % ABV  
ERM-BA005**

Batch: a  
Unit size: 330 mL  
Certified values:  
Alcohol strength:  
5.07 ± 0.05 %

A supply of pasteurised lager was obtained from a commercial source

This material is intended for use as a reference material for the development, validation or quality control of methods for the determination of alcohol in alcoholic beverages.



4005

**Brandy - 40 % ABV  
LGC5000**

Batch: 4  
Unit size: 50 mL  
Certified values:  
Apparent alcoholic strength:  
37.834 ± 0.035 % ABV  
Actual alcoholic strength:  
40.075 +0.070 / - 0.067 ABV  
Apparent density:  
950.376 ± 0.056 kg/m<sup>3</sup>

A supply of brandy was obtained from a commercial source.

This material is intended to be used for calibration of density meters and the validation of methods for the determination of alcoholic strength in obscured spirits by the UK statutory method of distillation and density measurement.



4005

**Lager shandy  
LGC5004**

Batch: 1  
Unit size: 330 mL  
Certified values:  
Alcohol: 1.02 ± 0.02 %

A suitable supply of lager shandy was obtained from a commercial source.

This material is intended for use in the validation of methods for the determination of alcohol.



4005

**Whisky - congeners**  
**LGC5100**



**4005**

Batch: 2  
Unit size: 10 mL

A suitable supply of whisky was obtained from a commercial source.

This material is intended for use in development, validation or quality control of analytical methods for the determination of congeners in spirit samples. The material may also be applicable to other matrices where suitable reference materials are not available.

**Certified values:**

Methanol	5.20±0.32 g/100 L	2-Methyl butanol	21.4 ± 0.72 g/100 L
Propanol	57.0±2.4 g/100 L	3-Methyl butanol	58.2 ± 2.1 g/100 L
2-Methyl Propanol	58.8±3.1 g/100 L	Butanol	0.48±0.11 g/100 L

**Indicative values:**

Ethyl Acetate	23 g/100 L of alcohol	Apparent Alcohol Content	40.06 % ABV
Furfural	0.82 g/100 L of alcohol		

## Drink Products

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### **Orange juice ERM-BD011**

Commercially obtained orange juice was diluted with water.

Batch: a  
Unit size: 3 mL  
Certified values:

Degrees brix:  
 $1.26 \pm 0.08$

Refractive index:  
 $1.3348 \pm 0.0002$

This material is intended for use as a reference material in the development, validation or quality control of analytical methods for the determination of degrees Brix or refractive index of sugar solutions and food extracts.



4005

### **Orange juice ERM-BD013**

Commercially obtained orange juice was enriched with sucrose.

Batch: a  
Unit size: 3 mL  
Certified values:

Degrees brix:  
 $22.07 \pm 0.08$

Refractive index:  
 $1.3673 \pm 0.0002$

This material is intended for use as a reference material in the development, validation or quality control of analytical methods for the determination of degrees Brix or refractive index of sugar solutions and food extracts.



4005

### **Orange juice ERM-BD014**

Commercially obtained orange juice was enriched with sucrose.

Batch: a  
Unit size: 3 mL  
Certified values:

Degrees brix:  
 $55.55 \pm 0.19$

Refractive index:  
 $1.4320 \pm 0.0005$

This material is intended for use as a reference material in the development, validation or quality control of analytical methods for the determination of degrees Brix or refractive index of sugar solutions and food extracts.



4005

### **Fruit Squash – Total SO<sub>2</sub> LGC7113**

The material was prepared using a commercially sourced Cranberry and raspberry squash which was spiked with sodium metabisulfite to raise the SO<sub>2</sub> concentration to the required level.

Batch: 1  
Unit size: 55 mL  
Certified value:

Total Sulfur Dioxide  
 $255 \pm 41$  mg/L

This material is intended for use in the development, validation Or quality control of analytical methods for the determination of total SO<sub>2</sub> in beverages.



4005



**Soft drink - colours  
LGC7140**

Batch: 1

Unit size: 60 mL

Assessed values:

Ponceau 4R (E124):

18.7 ± 0.2 mg/L

Sunset yellow (E110):

19.6 ± 0.2 mg/L

Tartrazine (E102):

29.9 ± 0.3 mg/L

Known weights of three food colours were added to a diluted solution of commercial soft drink concentrate.

This material is intended for use in the development, validation or quality control of methods for the determination of Ponceau 4R (E124), Sunset Yellow (E110) and Tartrazine (E102).

## Fish and Fish Products

### Crab paste - proximates and elements LGC7164



4005

Batch: 1  
Unit size: 140 g

Brown crab meat purchased from a commercial supplier was blended with small amounts of sodium polyphosphate, sodium chloride and water to a smooth paste. The paste was dispensed into cans, sealed and then heat treated to ensure sterility.

For constituents where the assigned value is described as Certified or Assessed, the intended use of this material is for the development, validation, (including the assessment of method bias), and quality control of methods for the analysis of crab and seafood products. Where the assigned value is described as Indicative, the material is suitable for monitoring the performance of a method or analyst, but not suitable for assessing method bias. The material may also be applicable to other similar matrices and procedures where suitable reference materials are not available.

Certified values:			
Moisture	59.26 ± 0.56 g/100 g	Lead	0.0697 ± 0.0047 mg/kg
Nitrogen	3.541 ± 0.087 g/100 g	Magnesium	43.1 ± 3.8 mg/100 g
Total fat	12.13 ± 0.72 g/100 g	Manganese	3.28 ± 0.29 mg/kg
Ash	2.855 ± 0.059 g/100 g	Phosphorus	564 ± 40 mg/100 g
Chloride	0.78 ± 0.10 g/100 g	Potassium	179 ± 11 mg/100 g
Calcium	348 ± 35 mg/100 g	Sodium	463 ± 45 mg/100 g
Cadmium	9.20 ± 0.48 mg/kg	Zinc	56.8 ± 5.5 mg/kg
Copper	20.1 ± 2.4 mg/kg		

Assessed values:			
Arsenic	13.8 ± 1.8 mg/kg	Cobalt	0.131 ± 0.022 mg/kg
Iron	3.17 ± 0.54 mg/kg		

Indicative values:			
Aluminium	Range 1 – 4 mg/kg	Nickel	Range 0.1 – 1.1 mg/kg
Chromium	Range 0.05 – 1.0 mg/kg	Selenium	Range 1.4 – 4.0 mg/kg
Mercury	Range 0.08 – 0.11 mg/kg		

## Food & Beverage Purity Materials

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**Butylated hydroxyanisole  
(BHA)  
ERM-AC301**

Batch: a  
Unit size: 0.5 g  
Certified value:  
Purity:  
99.2 ± 0.6 mass %

A batch of butylated hydroxyanisole was obtained from a commercial supplier of chemical reagents. The purity was assessed by combining data from HPLC-UV, DSC and GC.

This material is primarily intended for use as a calibration standard in methods of analysis for BHA in foodstuffs and other similar matrices.



4005

**Leucomalachite green  
ERM-AC303**

Batch: a  
Unit size: 0.1 g  
Certified value:  
Purity:  
98.8 ± 0.8 mass %

A batch of leucomalachite green was obtained from a commercial supplier of chemical reagents. The purity of the material was determined by HPLC-UV.

The primary use of this reference material is for the calibration of methods for the determination of leucomalachite green in fish and other similar matrices.



4005

***p,p'*-DDE  
LGC1110**

Batch: 1  
Unit size: 0.25 g  
Certified value:  
Purity:  
99.6 ± 0.4 mass %

A batch of *p,p'*-DDE was obtained from a commercial supplier, ground and dried under vacuum.

This material is intended for use in the preparation of solutions for the calibration of analytical instruments used in pesticide residue and formulation analysis.



4005

**Malathion  
LGC1205**

Batch: 1  
Unit size: 0.25 g  
Certified value:  
Purity:  
99.4 ± 0.6 mass %

A batch of malathion was dried at ambient temperature under vacuum.

This material is intended for use as a calibration standard in methods of analysis for malathion in food, environmental and other relevant matrices.

**Butylated hydroxytoluene  
(BHT)  
LGC7300**

Batch : 1  
Unit size: 0.5 g  
Certified value:

Purity:  
99.8 + 0.2/- 1.4 mass %

A batch of butylated hydroxytoluene, obtained from a commercial supplier of chemical reagents, was ground, mixed and dispensed.

This material is intended for use as a calibration standard in methods of analysis for BHT in foodstuffs and other relevant matrices.



4005

**Saccharin  
LGC7302**

Batch: 1  
Unit size: 0.5 g  
Certified value:

Purity:  
99.6 + 0.4/- 0.6 mass %

A batch of saccharin, obtained from a commercial supplier of chemical reagents, was ground, mixed and dispensed.

This material is intended for use as a calibration standard in methods of analysis for saccharin in foodstuffs, beverages and other relevant matrices.



4005

**Potassium sorbate  
LGC7305**

Batch: 1  
Unit size: 0.5 g  
Certified value:

Purity:  
99.8 ± 1.6 mass %

A batch of potassium sorbate, obtained from a commercial supplier of chemical reagents, was ground, mixed, dried over P<sub>2</sub>O<sub>5</sub> and dispensed.

This material is intended for use as a calibration standard in methods of analysis for potassium sorbate in foodstuffs and other relevant matrices.

**Selenomethionine  
enriched with <sup>76</sup>Se  
LGC7330**

Batch: 1  
Unit size: 0.01 g  
Certified value:

Purity:  
99.8 +0.2/-3.1 mass %

A quantity of <sup>76</sup>Se -enriched selenomethionine was prepared from <sup>76</sup>Se -enriched selenium obtained from a commercial supplier.

The primary use of this material is as a spike material for the determination of selenomethionine by species-specific isotope dilution with HPLC-ICP-MS, in combination with a standard of selenomethionine with natural isotopic composition.

## Fruit and Vegetable Products

### Strawberry leaves LGC7162

Batch: 1  
Unit size: 20 g

The raw material was collected from a private farm in the Czech Republic. The mixture was cut and jet milled to pass a 250 µm nylon sieve. The resulting powder was homogenised, separated in 20 g portions and placed in 60 mL bottles.

This material is intended for use in development, validation or quality control of analytical methods for the determination of elements in vegetation.

#### Certified values:

Arsenic	0.28 ± 0.07 mg/kg	Manganese	171 ± 10 mg/kg
Barium	107 ± 10 mg/kg	Mercury	0.027 ± 0.006 mg/kg
Cadmium	0.17 ± 0.04 mg/kg	Nickel	2.6 ± 0.7 mg/kg
Calcium	1.53 ± 0.07 g/100 g	Nitrogen	2.01 ± 0.06 g/100 g
Molybdenum	0.32 ± 0.08 mg/kg	Phosphorus	0.260 ± 0.023 g/100 g
Magnesium	0.377 ± 0.017 g/100 g	Potassium	1.96 ± 0.10 g/100 g
Chromium	2.15 ± 0.34 mg/kg	Strontium	64 ± 6 mg/kg
Cobalt	0.47 ± 0.11 mg/kg	Sulfur	0.174 ± 0.016 g/100 g
Iron	818 ± 48 mg/kg	Zinc	24 ± 5 mg/kg
Lead	1.8 ± 0.4 mg/kg		

#### Indicative values:

Total Aluminium	0.1 g/100 g	Total sodium	210 mg/kg
Extractable Aluminium	0.06 g/100 g	Extractable sodium	65 mg/kg
Copper	10 mg/kg	Selenium	0.04 mg/kg
Lithium	0.7 mg/kg	Vanadium	1.8 mg/kg

## Meat and Meat Products

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### **Horsemeat LGC7220**

Batch: 6  
Unit size: 10 g  
Assessed value  
Ground raw horsemeat

Horsemeat was purchased from a commercial source as one rump joint, labelled as horse rump. The surface of the meat was removed and discarded to minimise the risk of cross-contamination and then the sample was prepared by removing any separable fat, retaining the lean meat. The lean meat was cubed, homogenised in a food processor, combined and then mixed.

This material is intended for use as a reference material in procedures for the identification of horsemeat.

The species content of this material was checked using both an immunoassay test and DNA analysis.



4005

### **Beef LGC7221**

Batch: 7  
Unit size: 10 g  
Assessed value  
Ground raw beef

Beef was purchased from a commercial source as one topside joint, labelled as beef topside joint. The surface of the meat was removed and discarded to minimise the risk of cross-contamination and then the sample was prepared by removing any separable fat, retaining the lean meat. The lean meat was cubed, homogenised in a food processor, combined and then mixed.

This material is intended for use as a reference material in procedures for the identification of beef.

The species content of this material was checked using both an immunoassay test and DNA analysis.



4005

### **Pork LGC7222**

Batch: 6  
Unit size: 10 g  
Assessed value  
Ground raw pork

Pork was purchased from a commercial source as one piece of boned leg. The piece was trimmed and the lean meat homogenised to produce a paste.

This material is intended for use as a reference material in procedures for the identification of pork.

The species content of this material was checked using both an immunoassay test and DNA analysis.



4005

### **Sheep meat LGC7223**

Batch: 5  
Unit size: 10 g  
Assessed value  
Ground raw sheep

Sheep meat was purchased from a commercial source as one leg joint, labelled as lamb leg – bone in. The surface of the meat was trimmed and discarded to minimise the risk of cross-contamination and then the sample was prepared by removing any separable fat, gristle, bone etc., retaining the lean meat. The lean meat was cubed, homogenised in a food processor, combined and then mixed.

This material is intended for use as a reference material in procedures for the identification of sheep meat.

The species content of this material was checked using both an immunoassay test and DNA analysis.



4005

**Chicken meat  
LGC7224**

Batch: 5  
Unit size: 10 g  
Assessed value  
Ground raw chicken meat

Chicken was purchased from a commercial source as three birds, labelled as "whole chicken". The skin was removed and then the sample was prepared by removing any separable fat, gristle, bone etc., retaining the lean meat. The lean meat was cubed, homogenised in a food processor, combined and then mixed.

This material is intended for use as a reference material in procedures for the identification of chicken meat.

The species content of this material was checked using both an immunoassay test and DNA analysis.



4005

**Turkey meat  
LGC7225**

Batch: 5  
Unit Size: 10 g  
Assessed value  
Ground raw turkey meat

Turkey was purchased from a commercial source as one whole bird, labelled as bronze turkey. The skin was removed and then the sample was prepared by removing the breast meat from any separable fat, gristle, bone etc. The breast meat was cubed, homogenised in a food processor, combined and then mixed.

This material is intended for use as a reference material in procedures for the identification of turkey meat.

The species content of this material was checked using both an immunoassay test and DNA analysis.



4005

**Goat meat  
LGC7226**

Batch: 4  
Unit size: 10 g  
Assessed value  
Ground raw goat meat

Goat meat was purchased from a commercial source as one bone-in leg joint, labelled as whole kid goat leg. The sample was surface trimmed and then prepared by removing any separable fat, gristle, bone etc., retaining the lean meat. The lean meat was cubed, homogenised in a food processor, combined and then mixed.

This material is intended for use as a reference material in procedures for the identification of goat meat.

The species content of this material was checked using DNA sequencing, a PCR based method and an immunoassay method.



4005

**1 % w/w Horsemeat in Beef  
(nominal)  
LGC7240**

Batch: 6  
Unit size: 2 g  
Assessed value  
Horsemeat as a percentage of  
total meat: 1%

The material was prepared by weighing the required amounts of authentic meat materials LGC7220 Horsemeat and LGC7221 Beef into 60 mL screw-cap sample containers.

This material is intended for use as a reference material (positive control) in procedures for the identification of horsemeat in beef.

**1 % w/w Pork in Beef  
(nominal)  
LGC7242**

Batch: 6  
Unit size: 2 g  
Assessed Value  
Pork as a percentage of total  
meat: 1%

The material was prepared by weighing the required amounts of authentic meat materials LGC7222 Pork and LGC7221 Beef into 60 mL screw-cap sample containers.

This material is intended for use as a positive control material in procedures for the identification of pork in beef.

**1 % w/w Chicken Meat in  
Sheep Meat (nominal)  
LGC7244**

Batch: 5

Unit Size: 2 g

Assessed Value

Chicken Meat as a percentage  
of total meat: 1 %

This material was prepared by weighing the required amounts of authentic meat materials LGC7224 Chicken Meat and LGC7223 Sheep Meat into 60 mL screw-cap sample containers.

The material is intended for use as a reference material (positive control) in procedures for the identification of chicken meat in sheep meat.

**1 % w/w Turkey Meat in  
Sheep Meat (nominal)  
LGC7246**

Batch: 5

Unit Size: 2 g

Assessed Value

Turkey Meat as a percentage of  
total meat: 1 %

This material was prepared by weighing the required amounts of authentic meat materials LGC7225 Turkey Meat and LGC7223 Sheep Meat into 60 mL screw-cap sample containers.

The material is intended for use as a reference material (positive control) in procedures for the identification of turkey meat in sheep meat.

**1 % w/w Beef in Sheep Meat  
(nominal)  
LGC7248**

Batch: 5

Unit Size: 2 g

Assessed Value

Beef as a percentage of total  
meat: 1 %

This material was prepared by weighing the required amounts of authentic meat materials, LGC7221 Beef and LGC7223 Sheep meat into 60 mL screw-cap sample containers.

The material is intended for use as a reference material (positive control) in procedures for the identification of beef in sheep meat.



## Processed Food Products

### Wheat flour selenium and selenomethionine ERM-BC210

Batch: a  
Unit size: 30 g  
Certified values:  
Total selenium:  
17.23 ± 0.91 mg/L

Selenomethionine:  
27.4 ± 2.6 mg/L

Selenised wheat was obtained from a UK university. The grain was cleaned with water, milled at a temperature between 18 °C and 20 °C and 60 % relative humidity, and sieved twice to a final particle size of 140 µm.

The primary use of this certified reference material is for the validation of methods for the determination of selenium and selenomethionine in food materials and dietary supplements.



4005

### Sugar confectionery -sugars ERM-BD016

Batch: a  
Unit size: 14 g  
Certified values:  
Glucose: 5.74 ± 0.48 g/100 g  
Fructose: 2.89 ± 0.30 g/100 g  
Sucrose: 44.8 ± 1.4 g/100 g  
Maltose: 17.7 ± 1.1 g/100 g

A commercial supply of sugar confectionery was ground, thoroughly mixed and dispensed as 14 g units into 30 mL amber glass bottles with tamper evident caps.

This material is intended for use in development, validation or quality control of analytical methods for the determination of sugars in foodstuffs. The material may also be applicable to other similar matrices where suitable reference materials are not available.



4005

### Chocolate confectionery LGC7016

Batch: 3  
Unit size: 15 g

Indicative values:  
Fructose: 0.2 g/100g  
Glucose: 0.2 g/100g

Calculated values:  
Milk in fat: 19.6 g/100g  
Milk fat in sample: 5.8 g/100g

A commercial supply of sugar confectionery was obtained.

This material is intended for use in development, validation or quality control of analytical methods for the determination of sugar in foodstuffs.



4005

Assessed values:			
<b>Lactose</b>	7.06 ± 0.96 g/100 g	Butyric acid in fat	0.677 ± 0.071 g/100 g
<b>Sucrose</b>	46.5 ± 2.3 g/100 g	Nitrogen	1.274 ± 0.024 g/100 g
<b>Total Fat</b>	29.64 ± 0.35 g/100 g		

**Sweet digestive biscuit  
LGC7103**



4005

Batch: 3  
Unit size: 48 g

Wholemeal digestive biscuits were obtained from a commercial supplier.

This material is intended for use in the development, validation or quality control of analytical methods for the determination of proximates, sugars and elements in food.

The material may also be applicable to other matrices where suitable materials are not available.

**Assessed values:**

Moisture	2.88±0.76 g/100 g	Ash at 550°C	1.599±0.077 g/100 g
Nitrogen	1.073±0.032 g/100 g	Sucrose	13.89±0.53 g/100 g
Total Fat	21.17±0.45g/ 100 g	Chloride	0.302±0.018 g/100 g

**Assessed values:**

Sodium	5010±400 mg/kg	Phosphorus	900±140 mg/kg
Potassium	1580±170 mg/kg	Manganese	254±59 mg/kg
Magnesium	254±59 mg/kg	Zinc	6.41±0.99 mg/kg

**Chocolate mousse  
dessert – peanut protein  
LGCQC101-KT**

Batch: 1  
Unit size: 2 x 5 g

Indicative values:  
LGCQC1011 peanut protein:  
<1 mg/kg (negative control)  
LGCQC1012 peanut protein:  
10 mg/kg (positive control)

The materials were prepared by mixing commercial, dry food ingredients to make a paste. Peanut protein was added to LGCQC1012 using a commercial defatted peanut flour (57 g/100 g protein content).

The materials are intended for use as quality control materials for analytical methods used in the determination of peanut protein in foods.

They are not suitable for establishing method bias.

**Peanut flour  
LGCQC1020**

Batch: 1  
Unit size: 2 x 5g

Light roasted, partially defatted, peanut flour.

**Calculated value:**

Protein	49.7 g /100 g
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**Indicative values:**

Total Nitrogen	9.1 g / 100 g
Water	4.8 g /100 g

**Processed meat -  
Proximates, chloride,  
hydroxyproline & metals  
LGC7155**



**4005**

Batch: 003  
Unit size: 50g

The material was prepared using a commercial pork-based processed meat. After thorough mincing and mixing, it was sealed in sachets in 50g portions and irradiated to sterilise using a dose of 18KGy.

The material is intended for use in the development, validation or quality control of analytical methods for the determination of major constituents and selected additional analytes in meat and meat products. The material may also be applicable to other matrices and procedures where suitable reference materials are not available.

Certified values:	
Moisture	55.13 ± 0.43 g / 100 g
Nitrogen	2.202 ± 0.046 g / 100 g
Total fat	24.23 ± 0.59 g / 100 g
Ash	3.229 ± 0.059 g / 100 g
Chloride	1.377 ± 0.072 g / 100 g
Hydroxyproline	0.359 ± 0.025 g / 100 g

Certified values:	
Magnesium	11.02 ± 0.73 mg / 100 g
Phosphorus	236 ± 13 mg / 100 g
Potassium	187.4 ± 8.3 mg / 100 g
Sodium	1110 ± 63 mg / 100 g

Indicative values:	
Calcium	8 mg / 100g
Iron	0.6 mg / 100g
Nitrate (as NO <sub>3</sub> )	0.6 to 25.1 mg / kg

Calculated value:	
Salt (NaCl)	2.27 ± 0.12 g / 100 g

**Allergen reference material -  
Skimmed milk powder  
LGC7421**



**4005**

Batch: 001

Unit size: 1.1 ± 0.1 g

The raw material was sourced by the University of Manchester from a reputable supplier to minimise the risk of contamination, and was described as organic skimmed milk powder, produced in Austria from Austrian or EU pasteurised, skimmed milk. The skimmed milk powder was packaged as received without further processing by combining and mixing before weighing in (1.1 ± 0.1) g portions into amber glass vials. The vials were closed under argon with a rubber stopper and a crimp cap. Each unit was sealed inside a metallised sachet to minimise changes in water content.

The material is intended for use in (a) method development: e.g. in the generation of allergen kit calibrator extract solutions, (b) method validation: e.g. in the generation of external check calibrator extract solutions for allergen measurements (c) recovery estimates: to spike food matrices either by way of an extract, but preferably by addition of the raw material itself to assess allergen recovery in real life situations for which no other RMs are available.

LGC7421 can also be used in the quality control of methods for the determination of nitrogen and water in food ingredients and processed food products.

**Assessed values:**

Nitrogen	5.40 ± 0.17 g / 100 g
Water	4.22 ± 0.40 g / 100 g

**Allergen reference material -  
Egg white powder  
LGC7422**



**4005**

Batch: 001

Unit size: 1.1 ± 0.1 g

The raw material was sourced by the University of Manchester from a reputable supplier to minimise the risk of contamination, and was described as 'Origin: Austria'. The hens' egg white powder was packaged as received by combining and mixing before weighing in (1.1 ± 0.1) g portions into amber glass vials. The vials were closed under argon with a rubber stopper and a crimp cap. Each unit was sealed inside a metallised sachet to minimise changes in water content. 550 units were packaged and stored at (5 ± 4) °C.

The material is intended for use in (a) method development: e.g. in the generation of allergen kit calibrator extract solutions, (b) method validation: e.g. in the generation of external check calibrator extract solutions for allergen measurements (c) recovery estimates: to spike food matrices either by way of an extract, but preferably by addition of the raw material itself to assess allergen recovery in real life situations for which no other RMs are available.

LGC7422 can also be used in the quality control of methods for the determination of nitrogen and water in food ingredients and processed food products.

**Assessed values:**

Nitrogen	13.49 ± 0.41 g / 100 g
Water	6.01 ± 0.53 g / 100 g

**Allergen reference material -  
Almond powder  
LGC7424**



**4005**

Batch: 001

Unit size: 1.1 ± 0.1 g

The raw material was sourced by the University of Manchester from a reputable supplier to minimise the risk of contamination, and was described as: 'Origin: California, USA. Blanched ground almonds. The almond powder was packaged as received by combining and mixing before weighing in (1.1 ± 0.1) g portions into amber glass vials. The vials were closed under argon with a rubber stopper and a crimp cap. Each unit was sealed inside a metallised sachet to minimise changes in water content. 550 units were packaged and stored at (5 ± 4) °C.

The material is intended for use in (a) method development: e.g. in the generation of allergen kit calibrator extract solutions, (b) method validation: e.g. in the generation of external check calibrator extract solutions for allergen measurements (c) recovery estimates: to spike food matrices either by way of an extract, but preferably by addition of the raw material itself to assess allergen recovery in real life situations for which no other RMs are available.

LGC7424 can also be used in the quality control of methods for the determination of nitrogen and water in food ingredients and processed food products.

**Assessed values:**

Nitrogen	4.19 ± 0.13 g / 100 g
Water	4.22 ± 0.45 g / 100 g

**Allergen reference material -  
Hazelnut powder – partially  
defatted  
LGC7425**



**4005**

Batch: 001

Unit size: 1.1 ± 0.1 g

The raw material was sourced by the University of Manchester from a reputable supplier to minimise the risk of contamination, and was described as follows: 'Origin: South Island New Zealand Corylus avellana. Fine ground flour produced from the "cake" after the oil (fats) have been cold pressed out of raw hazelnut'. The hazelnut powder was packaged as received without further processing by combining and mixing before weighing in (1.1 ± 0.1) g portions into amber glass vials. The vials were closed under argon with a rubber stopper and a crimp cap. Each unit was sealed inside a metallised sachet to prevent changes in water content. 550 units were packaged and stored at (5 ± 4) °C.

The material is intended for use in (a) method development: e.g. in the generation of allergen kit calibrator extract solutions, (b) method validation: e.g. in the generation of external check calibrator extract solutions for allergen measurements (c) recovery estimates: to spike food matrices either by way of an extract, but preferably by addition of the raw material itself to assess allergen recovery in real life situations for which no other RMs are available.

LGC7425 can also be used in the quality control of methods for the determination of nitrogen and water in food ingredients and processed food products.

**Assessed values:**

Nitrogen	4.99 ± 0.16 g / 100 g
Water	8.6 ± 1.1 g / 100 g

**Allergen reference material -  
Walnut powder – partially  
defatted  
LGC7426**



4005

Batch: 001

Unit size: 1.1 ± 0.1 g

The raw material was sourced by the University of Manchester from a reputable supplier to minimise the risk of contamination, and was described as 'Origin: Italy. *Juglans regia* cultivar Lara. Lipid content 27 g/100g'.

The walnut powder was prepared by grinding using a centrifugal mill to pass a 0.5 mm sieve. The sieved material was combined and mixed before weighing in (1.1 ± 0.1) g portions into amber glass vials. The vials were closed under argon with a rubber stopper and a crimp cap. Each unit was sealed inside a metallised sachet to minimise changes in water content. 550 units were prepared and stored at (5 ± 4) °C.

The material is intended for use in (a) method development: e.g. in the generation of allergen kit calibrator extract solutions, (b) method validation: e.g. in the generation of external check calibrator extract solutions for allergen measurements (c) recovery estimates: to spike food matrices either by way of an extract, but preferably by addition of the raw material itself to assess allergen recovery in real life situations for which no other RMs are available.

LGC7426 can also be used in the quality control of methods for the determination of nitrogen and water in food ingredients and processed food products.

**Assessed values:**

Nitrogen	6.15 ± 0.19 g / 100 g
Water	6.11 ± 0.65 g / 100 g

**Allergen kit – Milk, Egg,  
Almond, Hazelnut and Walnut  
LGC746-KT**

Batch: 001

Unit size: Kit

Each kit contains:



4005

The allergen food ingredients (LGC7421, LGC7422, LGC7424, LGC7425 and LGC7426) are intended for use in method development: e.g. allergen kit calibrator extract solutions, method validation: e.g. external check calibrator extract solutions, and recovery estimates e.g. by spiking food matrices for which no RMs are available. They can also be used in the quality control of methods for the determination of nitrogen and water in food ingredients and processed food products.

The blank matrix (LGC7461) is intended for use (a) as a 'no-template' control to provide assurance of absence of in-lab allergen cross contamination (either environmentally, from personnel, or in reagents) and (b) a material to assist method limit of detection calculation (as 3.3 times the standard deviation of a 'blank' dataset).

The incurred matrix (LGC7462) is intended for use (a) to optimise analytical recovery from a chocolate-type matrix, (b) inform risk assessors of the possible 'true' estimate of allergen in a questioned product, and (c) in checking in-house quality control materials.

- One vial of each:  
LGC7421 Skimmed milk powder  
LGC7422 Egg white powder  
LGC7424 Almond powder  
LGC7425 Hazelnut powder – partially defatted  
LGC7426 Walnut powder – partially defatted

Assessed values:			
LGC7421	Skimmed milk powder	Nitrogen	5.40 ± 0.17 g / 100 g
		Water	4.22 ± 0.40 g / 100 g
LGC7422	Egg white powder	Nitrogen	13.49 ± 0.41 g / 100 g
		Water	6.01 ± 0.53 g / 100 g
LGC7424	Almond powder	Nitrogen	4.19 ± 0.13 g / 100 g
		Water	4.22 ± 0.45 g / 100 g
LGC7425	Hazelnut powder-partially defatted	Nitrogen	4.99 ± 0.16 g / 100 g
		Water	8.6 ± 1.1 g / 100 g
LGC7426	Walnut powder-partially defatted	Nitrogen	6.15 ± 0.19 g / 100 g
		Water	6.11 ± 0.65 g / 100 g

- Five bottles of:  
LGC7461 Chocolate paste – no added allergenic ingredients  
.LGC7462 Chocolate paste with added allergenic ingredients

Assessed values:			
LGC7461	Chocolate paste-no added allergenic ingredients	Milk protein	<0.05 mg/kg allergen protein
		Egg white protein	<0.05 mg/kg allergen protein
		Hazelnut protein	<0.04 mg/kg allergen protein
LGC7462	Chocolate paste with added allergenic ingredients	Milk protein	10.0 ± 1.8 mg/kg allergen protein
		Egg white protein	10.0 ± 1.5 mg/kg allergen protein
Indicative values:			
LGC7462	Chocolate paste with added allergenic ingredients	Almond protein	9.7 ± 1.9 mg/kg allergen protein
		Hazelnut protein	9.8 +10.5/-5.1 mg/kg allergen protein
		Walnut protein	10.0 ± 2.3 mg/kg allergen protein

## Animal Feeding Stuffs

### Poultry feed – proximates and elements LGC7173



4005

Batch: 004

Unit size: 50 g

A sample of poultry feed, purchased from a commercial animal feed manufacturer, was ground to pass a 1 mm sieve, thoroughly mixed and vacuum-sealed in sachets as 50 g portions.

This material is intended for use in the development, validation or quality control of analytical methods for the determination of proximates and elements in animal feeding stuffs. The material may also be applicable to other similar matrices where more clearly matched reference materials are not available.

#### Assessed values:

Moisture	10.70 ± 0.36 g/100 g
Nitrogen	2.559 ± 0.062 g/100 g
Oil	4.95 ± 0.23 g/100 g
Ash	7.224 ± 0.091 g/100 g
Crude Fibre	3.75 ± 0.38 g/100 g

#### Assessed values:

Calcium	17800 ± 1200 mg/kg
Copper	14.0 ± 4.0 mg/kg
Iron	148 ± 27 mg/kg
Magnesium	2037 ± 81 mg/kg
Manganese	90 ± 13 mg/kg
Phosphorus	6590 ± 370 mg/kg
Potassium	7480 ± 310 mg/kg
Sodium	1180 ± 130 mg/kg
Zinc	78 ± 15 mg/kg

#### Indicative values:

Starch	41 g/100 g
Chloride	0.23 g/100 g



# Industrial

## Elemental Analysis Material

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**Dibenzothiophene**  
**LGC4001**

Batch: 1  
Unit size: 0.5 g

Certified value:  
Sulfur:  
17.6 ± 0.4 % m/m

A supply of dibenzothiophene of adequate purity was obtained, from which aliquots were sub-sampled and sealed in vials.

This material is a micro-analytical standard intended for use in checking the performance of elemental analysers.

**Acetanilide**  
**LGC4002**

Batch: 1  
Unit size: 1 g

Certified value:  
Carbon: 71.09 % m/m  
Hydrogen: 6.71 % m/m  
Nitrogen: 10.36 % m/m

Acetanilide was purified by repeated fractional recrystallisation from the melt.

The resulting product was ground, sieved, tumbled and rolled on a laboratory mill to homogenise.

This material is intended for use in the calibration of instruments used in elemental analysis.

**Benzoic acid**  
**LGC4003**

Batch: 1  
Unit size: 1 g

Certified value:  
Oxygen:  
26.20 % m/m

Benzoic acid was purified by repeated fractional recrystallisation from the melt. The resulting product was ground, sieved, tumbled and rolled on a laboratory mill to homogenise.

This material is intended for use in the calibration of instruments used in elemental analysis.

The theoretical composition has been used as the certified value.

**4-Bromobenzoic acid**  
**LGC4008**

Batch: 1  
Unit size: 1 g

Certified value:  
Bromine:  
39.75 % m/m

Pure 4-bromobenzoic acid was ground, sieved, tumbled and rolled on a laboratory mill to homogenise.

This material is intended for use in the calibration of instruments used in elemental analysis.

The theoretical composition has been used as the certified value.

**2-Iodobenzoic acid**

**LGC4009**

Batch: 1

Unit Size: 1 g

Certified value:

Iodine: 51.17 % m/m

Pure 2-iodobenzoic acid was ground, sieved, tumbled and rolled on a laboratory mill to homogenise.

This material is intended for use in the calibration of instruments used in elemental analysis.

The theoretical composition has been used as the certified value.

## Enthalpy of Fusion

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**Indium**  
**LGC2601**

Batch: 3  
Unit size: 0.5 g

Certified value:  
Enthalpy of fusion:  
28.69 ± 0.09 J/g

Melting temperature:  
156.66 ± 0.19 °C

A suitable supply of indium was obtained with a nominal purity of 99.9999 mol %

This material is intended for the calibration of differential scanning calorimeters and similar instruments.



4005

**Naphthalene**  
**LGC2603**

Batch: 2  
Unit size: 0.5 g

Certified value:  
Enthalpy of fusion:  
18.923 ± 0.083 kJ/mol

Melting temperature:  
80.25 ± 0.03 °C

A suitable supply of pure material was obtained and purified by zone refining.

This material is intended for the calibration of differential scanning calorimeters and similar instruments.

**Benzil**  
**LGC2604**

Batch: 2  
Unit size: 0.5 g

Certified value:  
Enthalpy of fusion:  
23.26 ± 0.10 kJ/mol

Melting temperature:  
94.85 ± 0.02 °C

The bulk material was purified by repeated fractional freezing from the melt.

This material is intended for the calibration of differential scanning calorimeters and similar instruments.

**Acetanilide**  
**LGC2605**

Batch: 5  
Unit size: 0.5 g

Certified value:  
Enthalpy of fusion:  
21.793 ± 0.085 kJ/mol

Melting temperature:  
114.34 ± 0.02 °C

A suitable supply of pure material was obtained. Using differential scanning calorimetry (DSC) and adiabatic calorimetry the measured mole fraction of purity was 99.98 % and 99.996 % respectively.

This material is intended for the calibration of differential scanning calorimeters and similar instruments.

**Benzoic acid**  
**LGC2606**

Batch: 2  
Unit size: 0.5 g

Certified value:  
Enthalpy of fusion:  
17.98 ± 0.04 kJ/mol  
Melting temperature:  
122.35 ± 0.03 °C

The bulk material was purified by repeated fractional freezing from the melt.

This material is intended for the calibration of differential scanning calorimeters and similar instruments.

**Diphenylacetic acid**  
**LGC2607**

Batch: 6  
Unit size: 0.5 g

Certified value:  
Enthalpy of fusion:  
31.16 ± 0.13 kJ/mol

Melting temperature:  
147.19 ± 0.03 °C

A suitable supply of pure material was obtained. The purity of the material was assessed by adiabatic calorimetry; the measured mole fraction was 99.98%.

This material is intended for the calibration of differential scanning calorimeters and similar instruments.

**Lead**  
**LGC2608**

Batch: 1  
Unit size: 0.5 g

Certified value:  
Enthalpy of fusion:  
4.765 ± 0.012 kJ/mol

Melting temperature:  
327.47 ± 0.02 °C

A suitable supply of pure material was obtained. The purity of the material was assessed by adiabatic calorimetry; the measured mole fraction was 99.9995%.

This material is intended for the calibration of differential scanning calorimeters and similar instruments.

**Tin**  
**LGC2609**

Batch: 1  
Unit size: 0.5 g

Certified value:  
Enthalpy of fusion:  
7.187 ± 0.011 kJ/mol

Melting temperature:  
231.92 ± 0.02 °C

A suitable supply of pure material was obtained. The purity of the material was assessed by adiabatic calorimetry; the measured mole fraction was 99.9995%.

This material is intended for the calibration of differential scanning calorimeters and similar instruments.

**Biphenyl**  
**LGC2610**  
Batch: 1  
Unit size: 0.5 g

Certified value:  
Enthalpy of fusion:  
18.60 ± 0.11 kJ/mol

Melting temperature:  
68.93 ± 0.02 °C

A suitable supply of biphenyl was obtained and purified by repeated fractional freezing from the melt. The purity of the material was assessed by Adiabatic calorimetry; the measured mole fraction was 99.992%.

This material is intended for the calibration of differential scanning calorimeters and similar instruments.

**Zinc**  
**LGC2611**  
Batch: 1  
Unit size: 0.5 g

Certified value:  
Enthalpy of fusion:  
7.103 ± 0.034 kJ/mol

Melting temperature:  
419.53 ± 0.02 °C

A suitable supply of pure material was obtained. The purity of the material was assessed by Adiabatic calorimetry; the measured mole fraction was 99.9998%.

This material is intended for the calibration of differential scanning calorimeters and similar instruments.

**Aluminium**  
**LGC2612**  
Batch: 1  
Unit size: 0.5 g

Certified value:  
Enthalpy of fusion:  
10.827 ± 0.052 kJ/mol

Melting temperature:  
660.33 ± 0.05 °C

A suitable supply of pure material was obtained. The purity of the material was assessed by Adiabatic calorimetry; the measured mole fraction was 99.9995%.

This material is intended for the calibration of differential scanning calorimeters and similar instruments.

**Phenyl Salicylate**  
**LGC2613**  
Batch: 1  
Unit size: 0.5 g

Certified value:  
Enthalpy of fusion:  
19.18 ± 0.08 kJ/mol

Melting temperature:  
41.79 ± 0.03 °C

A commercial supply of phenyl salicylate was obtained and purified by fractional crystallisation. The purity of the material was assessed by Adiabatic calorimetry; the measured mole fraction was 99.994%.

This material is intended for the calibration of differential scanning calorimeters and similar instruments.

## Flash Point Material

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**N-Nonane**  
**ERM-FC032**

Batch: a

Unit size: 100 mL

Certified value:

Non-equilibrium flashpoint:

32.5 ± 0.5 °C

A supply of n-nonane, of nominally 99 % purity, was obtained from a commercial supplier.

This material is intended for use in validation work, or in quality control procedures, for the determination of non-equilibrium flashpoint determined by the Abel closed cup method as described in the Institute of Petroleum Standard IP170/95, and also published as British Standard BS2000:Part 170: 1995.



4005

**N-Decane**  
**ERM-FC033**

Batch: a

Unit size: 100 mL

Certified value:

Non-equilibrium flashpoint:

50.0 ± 0.9 °C

A supply of n-decane, of nominally 99 % purity, was obtained from a commercial supplier.

This material is intended for use in validation work, or in quality control procedures, for the determination of non-equilibrium flashpoint determined by the Abel closed cup method as described in the Institute of Petroleum Standard IP170/95, and also published as British Standard BS2000:Part 170: 1995.



4005

# Gypsum Material

## Natural gypsum – major oxides and trace elements LGC270



4005

Batch: 1

Unit size: 75 g

Natural gypsum, in the form of small chippings, was obtained from British Gypsum (East Leake, Leicestershire, UK). The material was prepared using a jaw crusher fitted with hardened chromium steel jaws to provide a powder, nominally 3 mm maximum diameter. The crushed material was dried at 30 °C in a calibrated drying oven. After drying, the material was milled until the powder passed a calibrated 75 µm stainless steel sieve mesh.

This reference material is intended for use in the validation of new methods, and for monitoring the performance of methods commonly used in laboratories to analyse samples of gypsum for quality control and environmental monitoring purposes.

Certified values:	
Mercury	1.35 ± 0.40 µg/kg

Assessed values:	
Aluminium (as Al <sub>2</sub> O <sub>3</sub> )	2.872 ± 0.056 g/100 g
Calcium (as CaO)	26.31 ± 0.36 g/100 g
Iron (as Fe <sub>2</sub> O <sub>3</sub> )	1.150 ± 0.062 g/100 g
Phosphorus (as P <sub>2</sub> O <sub>5</sub> )	0.0367 ± 0.0052 g/100 g
Potassium (as K <sub>2</sub> O)	0.830 ± 0.024 g/100 g
Nickel	9.5 ± 2.0 mg/kg
Vanadium	21.3 ± 3.2 mg/kg
Silicon (as SiO <sub>2</sub> )	10.93 ± 0.22 g/100 g
Sodium (as Na <sub>2</sub> O)	0.183 ± 0.018 g/100 g
Sulfur (as SO <sub>3</sub> )	34.67 ± 0.60 g/100 g
Titanium (as TiO <sub>2</sub> )	0.1480 ± 0.0075 g/100 g
Loss on Ignition	19.78 ± 0.71 g/100 g
Zinc	19.3 ± 3.8 mg/kg

Indicative values:			
Magnesium (as MgO)	3.2 g/100 g	Strontium (as SrO)	0.20 g/100 g
Manganese (as MnO)	0.030 g/100 g	Arsenic	2.4 mg/kg
Barium	170 mg/kg	Cobalt	3.8 mg/kg
Copper	5.0 mg/kg	Lead	4.2 mg/kg
Thallium	0.18 mg/kg		

**Natural anhydrite – major oxides and trace elements LGC2701**



4005

Batch: 1

Unit size: 75 g

Anhydrite, in the form of coarse chippings, was obtained from British Gypsum (East Leake, Leicestershire, UK). The material was prepared using a jaw crusher fitted with hardened chromium steel jaws to provide a powder, nominally 3 mm maximum diameter. The crushed material was dried at 30 °C in a calibrated drying oven.

After drying, the material was milled until the powder passed a calibrated 75 µm stainless steel sieve mesh.

This reference material is intended for use in the validation of new methods, and for monitoring the performance of methods commonly used in laboratories to analyse samples of gypsum for quality control and environmental monitoring purposes.

**Certified values:**

Mercury	2.33 ± 0.18 µg/kg
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**Assessed values:**

Aluminium (as Al <sub>2</sub> O <sub>3</sub> )	0.045 ± 0.029 g/100 g
Calcium (as CaO)	40.82 ± 0.67 g/100 g
Iron (as Fe <sub>2</sub> O <sub>3</sub> )	0.0280 ± 0.0096 g/100 g
Phosphorus (as P <sub>2</sub> O <sub>5</sub> )	0.0069 ± 0.0040 g/100 g
Potassium (as K <sub>2</sub> O)	0.0105 ± 0.0050 g/100 g
Silicon (as SiO <sub>2</sub> )	0.112 ± 0.044 g/100 g
Sulfur (as SO <sub>3</sub> )	57.8 ± 1.2 g/100 g
Loss on Ignition	0.452 ± 0.093 g/100 g

**Indicative values:**

Magnesium (as MgO)	0.080 g/100 g	Strontium (as SrO)	0.18 g/100 g
Manganese (as MnO)	0.0025 g/100 g	Titanium (as TiO <sub>2</sub> )	0.0066 g/100 g
Sodium (as Na <sub>2</sub> O)	0.023 g/100 g	Arsenic	0.16 mg/kg
Lead	1.6 mg/kg	Chromium	4.4 mg/kg
Nickel	1.9 mg/kg	Cobalt	0.35 mg/kg
Vanadium	2.6 mg/kg	Copper	3.5 mg/kg
Zinc	1.6 g/100 g		



**Blended gypsum – major oxides and trace elements LGC2702**



4005

Batch: 1

Unit size: 75 g

Blended gypsum, in the form of chippings and powders, was obtained from British Gypsum (East Leake, Leicestershire, UK). The material was dried at 30 °C in a calibrated drying oven, then ball-milled in a cleaned 250 mL capacity agate milling vessel until the powder passed a calibrated 75 µm stainless steel sieve mesh.

This reference material is intended for use in the validation of new methods, and for monitoring the performance of methods commonly used in laboratories to analyse samples of gypsum for quality control and environmental monitoring purposes.

**Certified values:**

Mercury	420 ± 35 µg/kg
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**Assessed values:**

Aluminium (as Al <sub>2</sub> O <sub>3</sub> )	1.121 ± 0.038 g/100 g
Calcium (as CaO)	31.47 ± 0.65 g/100 g
Iron (as Fe <sub>2</sub> O <sub>3</sub> )	0.392 ± 0.036 g/100 g
Phosphorus (as P <sub>2</sub> O <sub>5</sub> )	0.0177 ± 0.0079 g/100 g
Potassium (as K <sub>2</sub> O)	0.196 ± 0.013 g/100 g
Silicon (as SiO <sub>2</sub> )	3.01 ± 0.12 g/100 g
Sulfur (as SO <sub>3</sub> )	41.26 ± 0.69 g/100 g
Titanium (as TiO <sub>2</sub> )	0.0550 ± 0.0049 g/100 g
Loss on Ignition	21.32 ± 0.21 g/100 g
Lead	8.4 ± 2.1 mg/kg
Nickel	4.8 ± 1.4 mg/kg
Vanadium	10.5 ± 1.5 mg/kg
Zinc	11.7 ± 3.1 mg/kg

**Indicative values:**

Magnesium (as MgO)	0.92 g/100 g	Sodium (as Na <sub>2</sub> O)	0.031 g/100 g
Manganese (as MnO)	0.011 g/100 g	Strontium (as SrO)	0.13 g/100 g
Arsenic	2.4 mg/kg	Copper	4.4 mg/kg
Barium	43 mg/kg	Selenium	5.1 mg/kg
Chromium	9.0 mg/kg	Thallium	0.18 mg/kg
Cobalt	1.8 mg/kg		

**Desulfurised gypsum –  
major oxides and trace  
elements  
LGC2703**



4005

Batch: 1

Unit size: 75 g

Desulfurised (DSG) gypsum, in powder form, was obtained from British Gypsum (East Leake, Leicestershire, UK). The material was dried at 30 °C in a calibrated drying oven. After drying the material was ball-milled in a cleaned 250 mL capacity agate milling vessel until the powder passed a calibrated 75 µm stainless steel sieve mesh.

This reference material is intended for use in the validation of new methods, and monitoring the performance of methods commonly used in laboratories to analyse samples of gypsum for quality control and environmental monitoring purposes.

**Certified values:**

Mercury	646 ± 42 µg/kg
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**Assessed values:**

Aluminium (as Al <sub>2</sub> O <sub>3</sub> )	0.459 ± 0.031 g/100 g
Calcium (as CaO)	32.45 ± 0.86 g/100 g
Iron (as Fe <sub>2</sub> O <sub>3</sub> )	0.142 ± 0.023 g/100 g
Phosphorus (as P <sub>2</sub> O <sub>5</sub> )	0.0120 ± 0.0042 g/100 g
Potassium (as K <sub>2</sub> O)	0.0340 ± 0.0075 g/100 g
Silicon (as SiO <sub>2</sub> )	0.90 ± 0.12 g/100 g
Sulfur (as SO <sub>3</sub> )	44.84 ± 0.55 g/100 g
Titanium (as TiO <sub>2</sub> )	0.0325 ± 0.0046 g/100 g
Loss on Ignition	21.21 ± 0.35 g/100 g
Nickel	3.2 ± 1.3 mg/kg
Vanadium	6.0 ± 1.8 mg/kg
Zinc	9.5 ± 2.0 mg/kg

**Indicative values:**

Magnesium (as MgO)	0.16 g/100 g	Sodium (as Na <sub>2</sub> O)	0.022 g/100 g
Manganese (as MnO)	0.0040 g/100 g	Strontium (as SrO)	0.012 g/100 g
Arsenic	3.5 mg/kg	Lead	3.6 mg/kg
Chromium	7.9 mg/kg	Selenium	11 mg/kg
Cobalt	0.92 mg/kg	Thallium	0.076 mg/kg
Copper	2.8 mg/kg		

## Melting Point Materials

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**Carbazole**  
**ERM-FC021**

Batch: a  
Unit size: 0.25 g

Certified value:  
Liquefaction point:  
245.41 ± 0.29 °C

A batch of commercial carbazole was purified by recrystallisation and vacuum sublimation, then ground, homogenised and dried.

This material is intended for use in checking and calibrating apparatus used for the determination of melting points of samples in glass capillary tubes.



4005

0423

**2-Chloroanthraquinone**

**ERM-FC022**

Batch: a  
Unit size: 0.25 g

Certified value:  
Liquefaction point:  
209.73 ± 0.24 °C

A batch of commercial 2-chloroanthraquinone was purified by recrystallisation, then ground, homogenised and dried.

This material is intended for use in checking and calibrating apparatus used for the determination of melting points of samples in glass capillary tubes.



4005

0423

**Anisic acid**  
**ERM-FC023**

Batch: a  
Unit size: 0.25 g

Certified value:  
Liquefaction point:  
183.50 ± 0.31 °C

A batch of commercial anisic acid was ground, homogenised and dried.

This material is intended for use in checking and calibrating apparatus used for the determination of melting points of samples in glass capillary tubes.



4005

0423

**Diphenylacetic acid**

**ERM-FC024**

Batch: a

Unit Size: 0.25 g

Certified Value:

Liquefaction Point:

147.26 ± 0.31 °C

A batch of commercial diphenylacetic acid was ground, homogenised and dried.

This material is intended for use in checking and calibrating apparatus used for the determination of melting points of samples in glass capillary tubes.



4005



0423

**Benzoic acid**

**ERM-FC025**

Batch: a

Unit size: 0.25 g

Certified value:

Liquefaction point:

122.36 ± 0.26 °C

A batch of commercial benzoic acid was purified by fractional crystallisation, then ground, homogenised and dried.

This material is intended for use in checking and calibrating apparatus used for the determination of melting points of samples in glass capillary tubes.



4005



0423

**Acetanilide**

**ERM-FC026**

Batch: a

Unit size: 0.25 g

Certified value:

Liquefaction point:

114.19 ± 0.28 °C

A batch of commercial acetanilide was ground, homogenised and dried.

This material is intended for use in checking and calibrating apparatus used for the determination of melting points of samples in glass capillary tubes.



4005



0423

**Benzil**  
**ERM-FC027**

Batch: a  
Unit size: 0.25 g

Certified value:  
Liquefaction point:  
94.90 ± 0.24 °C

A batch of commercial benzil was ground, homogenised and dried.

This material is intended for use in checking and calibrating apparatus used for the determination of melting points of samples in glass capillary tubes.



4005

0423

**Naphthalene**  
**ERM-FC028**

Batch: a  
Unit size: 0.25 g

Certified value:  
Liquefaction point:  
80.34 ± 0.22 °C

A batch of commercial naphthalene was ground, homogenised and dried.

This material is intended for use in checking and calibrating apparatus used for the determination of melting points of samples in glass capillary tubes



4005

0423

**4-Nitrotoluene**  
**ERM-FC029**

Batch: a  
Unit size: 0.25 g

Certified value:  
Liquefaction point:  
51.66±0.18 °C

A batch of commercial 4-nitrotoluene was purified by fractional crystallisation, then ground, homogenised and dried.

This material is intended for use in checking and calibrating apparatus used for the determination of melting points of samples in glass capillary tubes.



4005

0423

**Phenyl salicylate**  
**ERM-FC030**

Batch: a  
Unit size: 0.25 g  
Certified value:

Liquefaction point:  
41.82 ±0.30 °C

A commercial supply of phenyl salicylate was obtained and the purity of the material was assessed by High Performance Liquid Chromatography.

This material is intended for use in checking and Calibrating apparatus used for the determination of melting points of samples in glass capillary tubes.



4005

0423

# Miscellaneous Materials

**Solvent yellow 124  
(SY 124)  
ERM-AC316**

Batch: a

Unit size: 0.2 g

Certified value:

Purity:

95.0 ± 1.2 mass %

A batch of Solvent Yellow 124 was obtained from a commercial source. The purity of the material was determined by HPLC-UV and GC.

This material is intended for use as an analytical standard for the determination of SY124 in fuel.

**Petrol – sulfur  
ERM-EF212**

Batch: a

Unit size: 19 mL

Certified value:

Sulfur: 20.2 ± 1.1 mg/kg

This material is a petroleum product containing sulfur in its natural forms, closely matching commercial petrol fuels.

This material is intended for use in the development, validation or quality control of analytical methods for the determination of sulfur in petrol.



4005

**Electronic cigarette  
liquid - nicotine  
& water  
ERM-DZ002**

Batch: a

Unit size: 1.2 mL

Certified value:

Nicotine (mg/g): 17.12 ± 0.47

Nicotine (mg/mL):  
18.39 ± 0.52

Water (g/100 g):  
10.76 ± 0.91

This material was certified for not only the concentration of nicotine in an e-liquid at a level close to legislative limits but also for the water content. Both values were determined using in-house analytical methods accredited to ISO/IEC 17025.

This material has been accepted as a European Reference Material (ERM®) following peer-review, with homogeneity and short term stability studies carried out.

The intended use of this material is for validation and quality control of methods for the determination of nicotine and water content in e-liquids. It can also be used in the training and evaluation of staff.

**Colloidal gold  
nanoparticle - nominal  
diameter  
30 nm**

Batch: 1

Unit size: 5.2 mL

This Quality Control material is intended, primarily, to evaluate and qualify methodology and/or instrument performance related to the number-based characterisation of nanoscale particles, including particle concentration and diameter.

**Assessed value:**

Number Particle Concentration NP/g (1.47 x 10<sup>11</sup>) ± (2.8 x 10<sup>10</sup>)

**Indicative values:**

Particle modal diameter nm 32.7 ± 2.0

Gold mass fraction mg/kg 45.1 ± 1.5

# Coming soon

LGC7161	Tomato paste
LGC6012	Hard Drinking Water- Anions

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COMING SOON



[www.lgcgroup.com/nml](http://www.lgcgroup.com/nml)

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