

# Statement of measurement



4005

## Sweet Digestive Biscuit

Reference Material LGC7103

### Assessed Values

Constituent	Number of laboratories	Assessed value <sup>1,2</sup> g/100 g	Uncertainty <sup>3</sup> g/100 g	Coverage factor, $k^3$	Minimum sample intake <sup>4</sup> g
Moisture	11	2.88	0.76	2.31	5
Nitrogen	13	1.073	0.032	2.16	1
Total fat <sup>5</sup>	9	21.17	0.45	2.12	3
Ash at 550 °C	14	1.599	0.077	2.12	5
Sucrose <sup>6</sup>	6	13.89	0.53	2.12	1
Chloride	7	0.302	0.018	2.05	5
		Assessed value <sup>1,2</sup> mg/kg	Uncertainty <sup>3</sup> mg/kg		
Sodium	11	5010	400	2.20	3
Potassium	12	1580	170	2.11	3
Magnesium	11	254	59	2.20	3
Phosphorus	10	900	140	2.18	3
Manganese	12	5.49	0.60	2.18	3
Zinc	10	6.41	0.99	2.18	3

#### Notes:

1. The values quoted are consensus data obtained from an inter-laboratory characterisation exercise using different methods. The means of means of technically valid data were used after outlier rejection at the 99 % confidence level. The uncertainty was based on the standard deviation of the mean of means of the same data with additional allowance for homogeneity and stability. Each data set was obtained in a different laboratory and/or using a different method of measurement.
2. The results are traceable to the SI through the physical and chemical standards used by the inter-laboratory study participant laboratories. The assessed values are reported to the same number of decimal places as the uncertainties; uncertainties are reported to 2 significant figures.
3. The quoted uncertainty is the half-width of the expanded uncertainty interval calculated using a coverage factor ( $k$ ), which gives a level of confidence of approximately 95 %.
4. The recommended minimum sample intake is based on the mass taken for homogeneity assessment.
5. Total fat determined using methods based on acid hydrolysis and solvent extraction.
6. Sucrose is expressed as the anhydrous sugar.

Date of issue: January 2012

Signed: \_\_\_\_\_  
Gill Holcombe (Mrs)  
for the Government Chemist



## Indicative Values

The following figures are provided for information purposes and should be regarded as indicative values only.

Constituent	Indicative value
Glucose <sup>1</sup>	0.23 g/100 g
Fructose <sup>1</sup>	0.25 g/100 g
Starch <sup>2</sup>	48 g/100 g
Calcium	480 mg/kg
Copper <sup>3</sup>	1.5 mg/kg
Iron <sup>3</sup>	18 mg/kg

Notes:

1. Glucose and fructose are expressed as the anhydrous sugars.
2. Starch is expressed as the monosaccharide (glucose).
3. The material is not homogeneous for copper and iron and the value for a particular test sample may differ from the value given by up to 30 %, based on 3 times the between unit standard deviation.

## Material Preparation

A commercial supply of wholemeal digestive biscuits was ground, thoroughly mixed and dispensed in 48 g units into foil pouches and vacuum sealed.

## Homogeneity

The homogeneity of the packaged material was assessed by analysing 10 randomly selected units for each of the constituents listed on page 1. An uncertainty contribution was calculated to allow for possible inhomogeneity and is included in the combined uncertainty.

## Characterisation

The material was characterised by means of an inter-laboratory exercise in which each participating laboratory was asked to carry out 5 replicate measurements on the material supplied. The analytical methods to be used were not specified by LGC, except for (a) the determination of the fat content, where laboratories were asked to use a method based on acid hydrolysis followed by solvent extraction, and for (b) ash, where laboratories were asked to use a final temperature of 550 °C. Laboratories generally employed commonly used classical and instrumental techniques. Laboratories used a variety of methods to determine moisture content including: 100-105 °C in a conventional oven for between 2.5 hr and overnight; (130 ± 3) °C for 1 hr and 70 °C in a vacuum oven.

The assessed values are based on the mean of the individual laboratory means, after elimination of outlying results detected by Grubbs tests at the 99 % level of confidence. The standard deviation of the mean (sometimes called standard error) of the laboratory means was used to estimate the standard uncertainty from the inter-laboratory characterisation exercise. The uncertainty of each assessed value (quoted in the table on page 1) was calculated by combining the inter-laboratory characterisation uncertainty with the uncertainty values calculated from the homogeneity assessment and the stability assessment, and expanded using an appropriate factor based on the effective degrees of freedom.

## Stability

Previous experience suggests that this material will be stable over the anticipated lifetime, however LGC7103 Batch 003 will be subjected to routine monitoring under LGC's 'reference material stability monitoring' programme. Purchasers will be informed of any changes that affect the assessed values.

## Intended Use

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 foods. Information on how to compare an analytical result with the assessed value can be found in ERM Application Note 1; [www.erm-crm.org](http://www.erm-crm.org)

## Instructions for Use

Before use, the contents should be allowed to equilibrate to a temperature of  $(20 \pm 5) ^\circ\text{C}$  and then transferred to a suitable container, such as a clean, dry, screw-cap glass jar. The material should be mixed by stirring before taking a sub-sample for analysis. The mass of material taken for the homogeneity assessment of each analyte is shown in the table on page 1, and represents the minimum mass which should be taken for analysis.

## Storage Conditions and Shelf Life

The reference material should be stored in the original unopened foil pouch at  $(5 \pm 4) ^\circ\text{C}$ , until it is required for use. It should be protected from moisture by enclosing the pouch in a bag or jar containing silica-gel. If stored under the recommended conditions, the assessed values of the unopened material will remain valid for 12 months from the date of shipment. After opening, the contents should be stored as above, and used within 5 days.

## Participants in the Inter-laboratory Exercise

The following laboratories took part in the inter-laboratory study for this material.

Abu Dhabi Food Control Authority	United Arab Emirates
AES Laboratories	India
Agricultural Research Council	South Africa
Chem-Science Laboratories	South Africa
Eclipse Scientific Group	UK
George Weston Technologies	Australia
Industry & Investment NSW	Australia
Kenya Bureau of Standards	Kenya
Land O' Lakes	USA
LATU	Uruguay
Noon Products	UK
Premier Analytical Services	UK
Reading Scientific Services	UK
SABS Commercial	South Africa
Salamon & Seaber	UK
Sciantec Analytical Services	UK
Scottish Agriculture College	UK

Unit Number
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Date of Shipment
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