CERTIFICATE OF ANALYSIS

ERM®- BD011a

Orange Juice – 1 °Brix			
Parameter	n	Certified Value [1, 2]	Uncertainty [3]
Degrees Brix	22	1.26	0.08
Refractive Index	15	1.3348	0.0002

1) Traceable to the methods used by the participating laboratories.

2) The material was certified by means of an inter-laboratory study. The value of n indicates the number of data sets used to characterise the parameter concerned. The certified values apply when the solution is at 20 °C ± 0.1 °C.

3) The quoted uncertainty is the half-width of the expanded uncertainty interval calculated using a coverage factor of two (*k*=2), which gives a level of confidence of approximately 95 %.

This certificate is valid for 12 months from the date of shipment provided the sample is stored unopened under the recommended conditions.

The minimum sample size is 1 mL.

NOTE

European Reference Material ERM®- BD011a was originally certified as LGC7011 Batch 002 (September 1999). It was produced and certified under the responsibility of LGC according to the principles laid down in the Technical Guidelines of the European Reference Materials® co-operation agreement between BAM-LGC-IRMM.

Accepted as an ERM®, Teddington, February 2004.
Certificate revised April 2018

Signed: _____

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UKAS REFERENCE MATERIALS
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DESCRIPTION OF THE SAMPLE

Commercially obtained orange juice was diluted with water. The solution was thoroughly mixed and dispensed as nominal 3 mL units into crimp-topped amber glass vials.

The material was tested for homogeneity by analysing randomly selected samples using densimetry (1 mL sample size). Some slight between-unit variations were observed, consequently the uncertainty values quoted on page 1 include an allowance for the effect of these variations.

The material has been tested for stability by analysing randomly selected samples which have been stored at various temperatures (-20 °C, 4 °C, 20 °C, 40 °C) over an appropriate period of time. No instability was observed.

INTENDED USE

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

ANALYTICAL METHOD USED FOR CERTIFICATION

The orange juice solution was certified by means of an inter-laboratory exercise. This involved the analysis of samples of the material by the participants using methods based on either refractometry or densimetry. Not all laboratories reporting °Brix by refractometry reported the corresponding refractive index value.

The certified values are based on the mean of laboratory means following elimination of outlying results. The uncertainties were calculated by combining the 95 % confidence intervals obtained from the inter-laboratory exercise with the uncertainty obtained from the homogeneity data for the material.

After elimination of outlying results, results were accepted from 5 laboratories for °Brix by densimetry and from 17 laboratories for °Brix by refractometry. There were no significant differences in mean °Brix values between the two methods (Table 1).

Table 1

	Degrees Brix	
	Value	Uncertainty
Refractometry	1.26	0.15
Densimetry	1.29	0.12

The uncertainty values given are standard deviations.

The certified refractive index values on page 1 are based on data obtained by participant laboratories using either white light or light of 589 nm wavelength. After elimination of outlying results, results from 5 laboratories for refractive index by white light and from 10 laboratories for refractive index at 589 nm were accepted. There was no significant difference in refractive index values by the two methods (Table 2).

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Table 2

	Refractive Index at 20 °C	
	Value	Uncertainty
White Light	1.3348	0.0002
589 nm	1.3348	0.0002

The uncertainty values given are standard deviations.

When reference is made to the ICUMSA SPS-3 (1994) refractometry tables, it is seen that the certified refractive index value gives a °Brix value that is not significantly different from the certified °Brix value (Table 3).

Table 3

Degrees Brix	
Certified Value (measured)	From ICUMSA SPS-3 Tables
1.26	1.26

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PARTICIPANTS

The material was characterised by an inter-laboratory study organised by LGC. The number of participants results used in the calculation of the certified values is given in the table of certified values on page 1. The following participants took part in the inter-laboratory exercise:

Australian Government Analytical Laboratories (Australia)

Bellingham and Stanley (UK)

British Sugar (UK)

Eclipse Scientific – Chatteris Laboratory (UK)

F Duerr and Sons Ltd (UK)

H J Heinz (UK)

Index Instruments (UK)

Instituto Nacional De Saude (Portugal)

Kyoto Electronics (Japan)

Law Laboratories (UK)

LGC (UK)

Meta Scientific (UK)

National Physical Laboratory (UK)

Nutrexpa SA (Spain)

Optical Activity (UK)

Paar Scientific (UK)

South Africa Bureau of Standards (South Africa)

The Duckworth Group (UK)

Vimto Soft Drinks (UK)

Weetabix Ltd (UK)

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SAFETY INFORMATION

Refer to Material Safety Data Sheet.

INSTRUCTIONS FOR USE

Before opening the vial, the material should be equilibrated to 20 °C ± 0.1 °C and thoroughly mixed by inverting the vial several times. Once the vial has been opened measurements should be carried out without delay in order to minimise the effect of any evaporative loss.

STORAGE

The material should be stored in the original un-opened vial at ≤ -18 °C until it is required for use. The opened vial should not be stored for reuse unless the user has evidence of stability.

CERTIFICATE REVISION

This certificate was revised in April 2018 to clarify the advice for users regarding opened units.

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ERM
European Reference Materials

Unit Number:	Shipment Date:

LEGAL NOTICE

(revised March 2008)

The values quoted in this certificate are the best estimate of the true values within the stated uncertainties and based on the techniques described herein. No warranty or representation, express or implied, is made that the use of the product or any information, material, apparatus, method or process which is the subject of or referred to in this certificate does not infringe any third party rights. Further, save to the extent: (a) prohibited by law; or (b) caused by a party's negligence; no party shall be liable for the use made of the product, any information, material, apparatus, method or process which is the subject of or referred to in this certificate. In no event shall the liability of any party exceed whichever is the lower of: (i) the value of the product; or (ii) £500,000; and any liability for loss of profit, loss of business or revenue, loss of anticipated savings, depletion of goodwill, any third-party claims or any indirect or consequential loss or damage in connection herewith is expressly excluded.

Production of this reference material and certificate was supported under contract with the Department of Trade and Industry as part of the National Measurement System Valid Analytical Measurement Programme.

This certificate may not be published except in full, unless permission for the publication of an approved extract has been obtained in writing from the Government Chemist. It does not of itself impute to the subject of measurement any attributes beyond those shown by the data contained herein.

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