



# CERTIFIED REFERENCE MATERIAL BCR<sup>®</sup> – 123

## CERTIFICATE OF ANALYSIS

ETHANOL			
	Parameter	Certified Value <sup>1)</sup>	Uncertainty <sup>2)</sup>
Ethanol H <sup>3)</sup>	(D/H) <sub>I</sub> (D/H) <sub>II</sub> R <sup>4)</sup>	109.65 x 10 <sup>-6</sup> 119.76 x 10 <sup>-6</sup> 2.184	0.20 x 10 <sup>-6</sup> 0.25 x 10 <sup>-6</sup> 0.005
Ethanol M <sup>3)</sup>	(D/H) <sub>I</sub> (D/H) <sub>II</sub> R <sup>4)</sup>	101.69 x 10 <sup>-6</sup> 130.94 x 10 <sup>-6</sup> 2.575	0.17 x 10 <sup>-6</sup> 0.21 x 10 <sup>-6</sup> 0.006
Ethanol L <sup>3)</sup>	(D/H) <sub>I</sub> (D/H) <sub>II</sub> R <sup>4)</sup>	90.30 x 10 <sup>-6</sup> 122.20 x 10 <sup>-6</sup> 2.708	0.18 x 10 <sup>-6</sup> (*) 0.4 x 10 <sup>-6</sup> 0.009 (*)

1) These values are the means of 16<sup>(\*)</sup> and 17 accepted mean values independently obtained by 17 laboratories applying <sup>2</sup>H-NMR (SNIF-NMR) using different NMR spectrometers of various origins. The values are traceable to a method (SNIF-NMR); the measurement procedure outlined in Commission Regulation (EEC) No. 2676/90 (Annex, Chapter 8) was strictly followed.

2) The uncertainty is taken as the half width of the 95 % confidence interval of the means defined in <sup>1)</sup>.

3) H, M and L refers to high, medium and low deuterium isotope ratios. The three ethanols H, M, and L correspond to designations C (alcohol from cane sugar), V (wine spirit), and B (beet sugar) as outlined in Commission Regulation (EEC) No. 2676/90, clause 4.2.2.

4) Ratio, defined as 2 x (D/H)<sub>II</sub> / (D/H)<sub>I</sub>

This certificate is valid for one year after purchase.

Sales date:

No sample preparation step is required; the tubes can be inserted in the NMR instrument and can directly be measured.

### NOTE

This material has been certified by BCR (Community Bureau of Reference, the former reference materials programme of the European Commission). The certificate has been revised under the responsibility of IRMM.

Brussels, June 1993  
Revised: February 2007

Signed: \_\_\_\_\_

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## DESCRIPTION OF THE SAMPLE

The reference material consists of three sealed NMR tubes containing H, M and L ethanol, respectively, to which tetramethylurea (TMU) as internal standard and C<sub>6</sub>F<sub>6</sub> (NMR lock substance) were added.

The reference material is supplied as:

BCR-123A: 10 mm O.D. NMR tubes

BCR-123B: 15 mm O.D. NMR tubes.

## ANALYTICAL METHOD USED FOR CERTIFICATION

Determinations were carried out by <sup>2</sup>H-NMR (SNIF-NMR) using NMR spectrometers of various types. Commission Regulation (EEC) No. 2676/90 was strictly followed.

## PARTICIPANTS

- Chemisches Untersuchungsamt, Speyer (DE)
- Community Bureau of Reference, Brussels (BE)
- Istituto Agrario Provinciale, San Michele All'Adige, Trento (IT)
- Eurofins, Nantes (FR)
- Joint Research Centre Ispra, Ispra (IT)
- Kodak Ltd. Research Laboratories, Harrow, Middlesex (GB)
- Laboratory of the Government Chemist, Teddington (GB)
- Pernod Ricard, Torino (IT)
- Station Oenologique, Montpellier (FR)
- The H.C. Oersted Institute, Copenhagen (DK)
- TNO ICT, Zeist (NL)
- Università di Bologna, Bologna (IT)
- Universität Marburg, Marburg (DE)
- Universität München, München (DE)
- Universität Regensburg, Regensburg (DE)
- Université de Nantes, Nantes (FR)
- Université de Strasbourg, Strasbourg (FR)
- University College Dublin, Dublin (IE)

## SAFETY INFORMATION

The usual laboratory safety measures apply.

## INSTRUCTIONS FOR USE

The three CRMs shall be used for the standardization (performance verification) of NMR spectrometers in SNIF-NMR measurements. It is recommended to routinely run the spectra of two of the reference ethanols which have (D/H)<sub>i</sub> values at the two extremities of the range of isotopic ratios usually determined in the laboratory. A period of one week between two calibration procedures is quite convenient for detecting any drift in the overall stability of the spectrometer.

## STORAGE

The NMR tubes should be kept at room temperature in the dark. However, the European Commission cannot be held responsible for changes that happen during storage of the material at the customer's premises, especially of inappropriately stored samples.

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## NOTE

A technical report on the production of BCR-123 is available on the internet (<http://www.irmm.jrc.be>). A paper copy can be obtained from IRMM on request.