National Institute of Standards & Technology

Certificate of Analysis

Standard Reference Material® 1473b

Low Density Polyethylene Resin

This Standard Reference Material (SRM) is intended for use in calibration and performance evaluation of instruments used in polymer technology and science for the determination of the Melt Flow Rate using ASTM D1238-00 [1]. A unit of SRM 1473b consists of approximately 60 g of white polyethylene pellets in a glass bottle.

Certified Values and Uncertainties: This material is certified for melt flow rate using ASTM D1238-00, Test Method for Flow Rates of Thermoplastics by Extrusion Plastometer [1] Standard Test Condition 190/2.16. The flow rate of the melt was determined at 190.0 °C ± 0.1 °C [2] and a load of 2.16 kg by procedure A of the ASTM method. A manually operated extrusion plastometer was used. Under these conditions [3], the certified melt flow rate for this material is as follows:

Melt Flow Rate (FR) = 1.13 g/10 min ± 0.098 g/10 min

The uncertainty is the numerical value of an expanded uncertainty $U = ku_c$, with U determined from a combined standard uncertainty, u_c, and coverage factor, $k = 2$ with a level of confidence of approximately 95 % following the ISO Guide [4]. Type A and Type B contributions to the expanded uncertainty include the standard deviation of the melt flow measurement, instrument-to-instrument variation as discussed in ASTM D1238-00, operator dependence of the measurement, and temperature gradients in the apparatus [3]. The standard deviation for an average single measurement is 0.013 g/10 min, with 47 degrees of freedom [3].

Expiration of Certification: The certification of **SRM 1473b** is valid, within the measurement uncertainty specified, until **01 January 2019**, provided the SRM is handled and stored in accordance with the instructions given in this certificate (see "Instructions for Storage and Use"). This certification is nullified if the SRM is damaged, contaminated, or otherwise modified.

Maintenance of SRM Certification: NIST will monitor this SRM over the period of its certification. If substantive technical changes occur that affect the certification before the expiration of this certificate, NIST will notify the purchaser. Registration (see attached sheet) will facilitate notification.

The technical coordination leading to certification of this SRM was provided by B.M. Fanconi of the NIST Polymers Division. The technical measurement and data interpretation were provided by C.M. Guttman, J.R. Maurey, C.R. Schultheisz, and W.R. Blair of the NIST Polymers Division.

Statistical analysis was provided by S.D. Leigh of the NIST Statistical Engineering Division.

Support aspects involved in the issuance of this SRM were coordinated through the NIST Measurement Services Division.

Eric K. Lin, Chief
Polymers Division

Gaithersburg, MD 20899
Certificate Issue Date: 17 October 2011
Certificate Revision History on Last Page

Robert L. Watters, Jr., Chief
Measurement Services Division

INSTRUCTIONS FOR STORAGE AND USE

Storage: The SRM should be stored in the original bottle with the lid tightly closed and under normal laboratory conditions.

Homogeneity: The homogeneity of SRM 1473b was tested by melt flow measurements using ASTM D1238-00. The characterization of this polymer is described in reference 3.

REFERENCES

[1] ASTM D1238-00; *Test Method for Melt Flow Rates of Thermoplastics by Extrusion Plastometer*; Annu. Book ASTM Stand., Vol. 08.01 (2001).

[2] Thompson, A.; Taylor, B.N.; *Guide for the Use of the International System of Units (SI)*; NIST Special Publication 811; U.S. Government Printing Office: Washington, DC (2008); available at http://ts.nist.gov/WeightsAndMeasures/Metric/mpo_pubs.cfm (accessed Oct 2011).

[3] Maurey, J.R.; Schultheisz, C.; Blair, W.R.; Guttman, C.M.; *Certification of Standard Reference Material 1473b, A Polyethylene Resin*; NIST Special Publication SP 260-144; U.S. Department of Commerce: Gaithersburg, MD (2002); available at http://www.nist.gov/srm/publications.cfm (accessed Oct 2011).

[4] JCGM 100:2008; *Evaluation of Measurement Data – Guide to the Expression of Uncertainty in Measurement* (ISO GUM 1995 with Minor Corrections); Joint Committee for Guides in Metrology (JCGM) (2008); available at http://www.bipm.org/utils/common/documents/jcgm/JCGM_100_2008_E.pdf (accessed Oct 2011); see also Taylor, B.N.; Kuyatt, C.E.; *Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results*; NIST Technical Note 1297; U.S. Government Printing Office: Washington, DC (1994); available at http://www.nist.gov/pml/pubs/index.cfm (accessed Oct 2011).

Certificate Revision History: 17 October 2011 (Extension of certification period; editorial changes); 29 November 2007 (Update of certification period); 11 July 2002 (Original certificate date).

Users of this SRM should ensure that the Certificate of Analysis in their possession is current. This can be accomplished by contacting the SRM Program: telephone (301) 975-2200; fax (301) 926-4751; e-mail srminfo@nist.gov; or via the Internet at http://www.nist.gov/srm.