



# National Institute of Standards & Technology

## Certificate of Analysis

### Standard Reference Material<sup>®</sup> 1483a

#### Linear Polyethylene

This Standard Reference Material (SRM) is intended primarily for use in calibration and performance evaluation of instruments used to determine the molecular mass and molecular mass distribution by high temperature size exclusion chromatography (SEC) and instruments used to obtain the high temperature dilute solution viscosity of the polymer. SRM 1483a is supplied in the form of a white powder in units of 0.3 g.

Property	Certified Value and Uncertainty
Certified Mass-Average Molecular Mass ( $M_w$ ):	32 100 g/mol $\pm$ 3 500 g/mol
Certified Number-Average Molecular Mass ( $M_n$ ):	28 900 g/mol $\pm$ 600 g/mol
Certified Intrinsic Viscosity [ $\eta$ ]:	80.0 mL/g $\pm$ 1.84 mL/g

**Certified Measurement Technique and Uncertainty:** The mass-average molecular mass ( $M_w$ ), and number-average molecular mass ( $M_n$ ) and their combined expanded uncertainties are described in references 1 and 2.

Intrinsic viscosity measurements were made at 130 °C in the solvent, 1,2,4-trichlorobenzene. Butylated hydroxytoluene (2,6-Di-*tert*-butyl-4-methylphenol) was added to the solvent at about 0.7 g/L as an antioxidant. Details of the intrinsic viscosity measurements on SRM 1483a are given in reference [3].

All certified measurement uncertainties are expressed as combined expanded uncertainties with a coverage factor  $k = 2$  for a level of confidence of approximately 95 %. The measurands are mass-average molecular mass; number-average molecular mass and intrinsic viscosity. The certified values are metrologically traceable to the SI unit for mass expressed as grams per mol, and to the SI unit for viscosity expressed as milliliters per gram; respectively.

**Expiration of Certification:** The certification of **SRM 1483a** is valid, within the measurement uncertainty specified, until **01 June 2020**, provided that the SRM is handled and stored in accordance with the instructions given in this certificate (see "Instruction for Storage"). The 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 changes occur that affect the certification before the expiration of this certificate, NIST will notify the purchaser. Registration (see attached sheet or register online) will facilitate notification.

Technical coordination leading to the certification of this material was provided by B.M. Fanconi. Technical measurement and data interpretation were provided by C.M. Guttman, of the NIST Materials Science and Engineering Division, and J.R. Maurey and W.R. Blair formerly of the NIST Polymers Division.

Support aspects involved in the issuance of this SRM were coordinated through the NIST Office of Reference Materials.

Eric K. Lin, Chief  
Material Science and Engineering Division

Gaithersburg, MD 20899  
Certificate Issue Date: 31 July 2015  
*Certificate Revision History on Last Page*

Robert L. Watters, Jr., Director  
Office of Reference Materials

**Homogeneity and Characterization:** The homogeneity of SRM 1483a was tested by SEC analysis of solutions in 1,2,4-trichlorobenzene at 130 °C. The characterization of this polymer is described in reference [4]. SRM 1483 was recertified as SRM 1483a.

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

#### REFERENCES

- [1] Wagner H.L.; Verdier, P.H.; *The Characterization of Linear Polyethylene SRM's 1482, 1483, and 1484 II; Number-Average Molecular Weights by Membrane Osmometry*; J. Res. Natl. Bur. Stand., Vol. 83, No. 2, pp. 179–184 (1978).
- [2] *Standard Reference Materials: The Characterization of Linear Polyethylene SRM's 1482, 1483, and 1484*; NIST Special Publication 260-61, pp. 169–201 (1978), available at: <http://www.nist.gov/srm/upload/SP260-61.PDF> (accessed Jul 2015).
- [3] Han, C.C.; Verdier P.H.; Wagner, H.L.; *The Characterization of Linear Polyethylene SRMs 1482, 1483, and 1484 III; Number-Average Molecular Weights by Light Scattering*; J. Res. Natl. Bur. Stand., Vol. 83, No. 2, pp. 185–193 (1978).
- [4] Guttman, C.M.; Blair, W.R.; *Recertification of the SRM 1483a, a Polyethylene*; NIST Special Publication 260-158 (2003).

<b>Certificate Revision History:</b> 31 July 2015 (Change of expiration date; editorial changes); 30 March 2004 (Original certificate date).
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*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) 948-3730; e-mail [srminfo@nist.gov](mailto:srminfo@nist.gov); or via the Internet <http://www.nist.gov/srm>.*