



# National Institute of Standards & Technology

## Certificate

### Standard Reference Material 1478

#### Polystyrene

#### (Narrow Molecular Weight Distribution)

This Standard Reference Material (SRM) is intended for the calibration of instruments used in polymer technology and science for the determination of molecular weight and molecular weight distribution. This SRM is supplied as a granular polystyrene in a 2 gram unit.

Property	Value	Standard deviation of the mean, percent	Degrees of freedom	Expected limit of systematic error, percent
Number-average molecular weight, $M_n$ , g/mol <sup>a</sup>	35,800	0.4	19	1 <sup>b</sup>
Weight-average molecular weight, $M_w$ , g/mol <sup>c</sup>	37,400	0.7	7	2 <sup>b</sup>
Limiting viscosity number, mL/g, at 25.0 °C in toluene <sup>d</sup>	23.06	0.07	33	0.5

<sup>a</sup>Determined by membrane osmometry in toluene at 37 °C.

<sup>b</sup>The expected limits of systematic error for the number- and weight-average molecular weights are based on analyses of the osmometry and ultracentrifugation determinations, respectively, without taking account of the necessity of  $M_w$  exceeding  $M_n$ .

<sup>c</sup>Determined by sedimentation equilibrium ultracentrifugation in cyclohexane at 35 °C, using a measured value of 0.932 mL/g for the partial specific volume of this Standard Reference Material.

<sup>d</sup>Determined by capillary viscometry at shear rates not exceeding 1800 s<sup>-1</sup>.

#### NOTICE AND WARNINGS TO USERS

Expiration of Certification: The certified values for this SRM will be valid for five years from date of shipment.

Storage: SRM 1478 should be stored in the tightly closed, original bottle under normal laboratory conditions.

*This Certificate has undergone editorial revision to reflect program and organizational changes at NIST and at the Department of Commerce. No attempt was made to reevaluate any technical data presented in this certificate.*

Gaithersburg, MD 20899  
July 15, 1992  
(Revision of certificate dated 1-17-79)

William P. Reed, Chief  
Standard Reference Materials Program

(over)

Gel permeation chromatography of this polystyrene sample reveals a small amount (less than 0.4 percent by weight) of a second component, with a molecular weight approximately twice that of the main component. Volatile content and ash content both estimated gravimetrically, do not exceed 0.05 percent and 0.01 percent, respectively.

The technical and support aspects involved in the revision, update, and issuance of this Standard Reference Material were coordinated through the Standard Reference Materials Program by J.C. Colbert.

The original analyses were performed by L.E. Smith, P.H. Verdier, F.W. Wang and H.L. Wagner of the NIST Polymers Division.

Technical assistance in the determination of weight-average molecular weight was provided by the following members of the Polymers Division by F.L. McCrackin, data processing; J.R. Maurey, experimental ultracentrifugation; and R.E. Lowry, microdensitometry.