



## National Institute of Standards & Technology

# Certificate of Analysis

## Standard Reference Material 1836

### Total Nitrogen in Lubricating Base Oil

This Standard Reference Material (SRM) is intended for use as an analytical standard for the determination of total nitrogen in lubricating base oils or materials of similar composition. SRM 1836 consists of four 5-mL vials each of four different lubricating base oils that have nominal nitrogen concentrations in the range from 10 to 170  $\mu\text{g/g}$  (ppm).

Total nitrogen is certified on the basis of two independent methods of analysis: (1) by determination of organically bound trace nitrogen in liquid petroleum hydrocarbons by oxidative combustion and chemiluminescence detection (Modified ASTM D4629-86) and (2) by a modified Kjeldahl Method (UOP 384-76, Nitrogen in Petroleum Distillates and Heavy Oil by Acid Extraction or Direct Kjeldahl Procedure). The certified values and associated uncertainties are:

Oil Sample Number	Total Nitrogen Concentration, $\mu\text{g/g}$ (ppm)
Oil I	$9.0 \pm 1.9$
Oil II	$50.9 \pm 1.6$
Oil III	$113.3 \pm 1.0$
Oil IV	$166.2 \pm 0.7$

The uncertainty stated for each value is two times the standard error of the certified value and includes contributions from the observed variability within and between measurement methods.

Notice: The certification of SRM 1836 is valid for three years from date of purchase.

Chemical analyses for the certification were performed by P. Pei of the Ceramics Division, Material Science and Engineering Laboratory and by the UOP Research center under the guidance of A. W. Drews, Des Plaines, IL. The physical property measurements were performed by H. Brown and P. Pei.

The statistical analysis of the certification data was performed by R. C. Paule of the National Measurement Laboratory.

The coordinators of the technical measurements were P. Pei, Research Chemist and S. M. Hsu, Chief, Ceramic Division, Material Science and Engineering Laboratory.

The technical and support aspects in the preparation, certification, issuance of this Standard Reference Material were coordinated through the Office of Standard Reference Materials by R. L. McKenzie.

Gaithersburg, MD 20899  
December, 31, 1989

William P. Reed, Acting Chief  
Office of Standard Reference Materials

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SRM 1836 was also characterized with respect to the physical properties shown in Table 1. These values are not certified, but are supplied to the user of SRM 1836 for use as *Information Only*.

Table 1  
Physical Properties for SRM 1836

	Flash Point <sup>a</sup> , °C	Kinematic Viscosity <sup>b</sup>		Pour Point <sup>c</sup> , °C	Density <sup>d</sup> , g/cm <sup>3</sup> 23 °C	Refractive Index <sup>e</sup> $\eta_D^{20}$
		40 °C	100 °C			
Oil I	189.4	16.8	3.54	-27	0.8666	1.4783
Oil II	183.9	18.4	3.86	-12	0.8549	1.4731
Oil III	242	130.6	12.9	-18	0.8775	1.4851
Oil IV	204	38.9	5.91	-12	0.8734	1.4831

Methods used for Physical Tests were:

<sup>a</sup>ASTM D93-80; Flash Point by Pensky-Martins Closed Tester

<sup>b</sup>ASTM D445-79; Kinematic Viscosity of Transparent and Opaque Liquids

<sup>c</sup>ASTM D97-66; Pour Point of Petroleum Oils

<sup>d</sup>ASTM D4052-81; Density and Relative Density of Liquids by Digital Density Meter (Modified)

<sup>e</sup>ASTM D1218-61; Test for Refractive Index and Refractive Dispersion of Hydrocarbon Liquids