

National Bureau of Standards

Certificate of Analysis

Standard Reference Material 1620a

Sulfur in Residual Fuel Oil

Sulfur Concentration 4.504 ± 0.010 weight percent

This Standard Reference Material is intended for use as an analytical standard in the determination of total sulfur in fuel oils or materials of similar matrices. SRM 1620a is a commercial "No. 5 Heavy" residual fuel oil as defined by American Society for Testing and Materials, ASTM.

Sulfur was certified using three independent methods of analysis: gravimetry, ion chromatography, and x-ray fluorescence.

The standard error of the certified value includes observed variability within and between measurement methods and any observed material heterogeneity.

NOTICE AND RECOMMENDED USE: Due to the high sulfur content of SRM 1620a, it is recommended that the bottle be shaken vigorously before sampling. Homogeneity and stability testing at NBS indicates that the best results are achieved when the material is shaken before use.

Analyses for certification were performed by W. F. Koch and E. R. Deardorff of the Inorganic Analytical Research Division and P. A. Pella of the Gas and Particulate Science Division.

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

The overall direction and coordination of the technical measurements leading to certification were performed under the chairmanship of E. L. Garner, Chief of the Inorganic Analytical Research Division.

The technical and support aspects involved in the preparation, certification, and issuance of this Standard Reference Material were coordinated through the Office of Standard Reference Materials by T. E. Gills.

SRM 1620a was also tested and found to exhibit the physical properties shown in Table 1. In addition, semi-quantitative values obtained by emission spectrometry are given in Table 2. These values are not certified, but supplied for information only.

Table 1
Physical Properties for SRM 1620a

Flash Point ^a °C	Kinematic Viscosity ^b 50 °C (cSt)	Pour Point ^c °C	Density @ 20 °C ^d g/cm ³
70	47.75	2	1.096

These measurements were performed by S. Weeks, Materials Chemistry Division, Center for Material Science.

Methods Used for Physical Tests

- a. ASTM D-93-80 Flash Point by Pensky-Martens Closed Tester
- b. ASTM D445-79 Kinematic Viscosity of Transparent and Opaque Liquids
- c. ASTM D97-66 (1978) Pour Point of Petroleum Oils
- d. ASTM D4052-81 Density and Relative Density of Liquids by Digital Density Meter (modified)

Table 2
Semi-Quantitative Emission Spectrometry
Analysis for SRM 1620a

Element	µg/mL	Element	µg/mL
Al	20	Mo	<1
B	<1	Na	31
Ca	9	Ni	<1
Cr	<1	Si	13
Cu	<1	Sn	<1
Fe	<5	Ti	<1
Mg	<1	V	<1
Mn	<1	Zn	23

Note: SRM 1620a was analyzed using the rotating disc method. This method is based on absolute amounts of sample since no internal standard is used to correct for the amount of sample actually analyzed. Differences in actual values may range from factors of 1-3.

These measurements were performed by J. A. Norris, Inorganic Analytical Research Division, Center for Analytical Chemistry.