# National Institute of Standards & Technology

# Certificate of Analysis

## Standard Reference Material 1621d

### Sulfur in Residual Fuel Oil

Sulfur Concentration . . . . . 1.011 ± 0.012 wt. percent

This Standard Reference Material (SRM) is intended for use in the calibration of instruments and the evaluation of methods used in the determination of total sulfur in fuel oils or materials of similar matrix. SRM 1621d is a commercial "No. 6" residual fuel oil as defined by the American Society for Testing and Materials, (ASTM). It consists of 100 mL of a residual fuel oil.

The sulfur content in SRM 1621d was certified using isotope dilution thermal ionization mass spectrometry (ID-TIMS). The certified value was confirmed using ASTM methods D-4294, D-1552, and ion chromatography. Homogeneity testing was performed using x-ray fluorescence spectrometry.

The stated ± uncertainty is the approximate 95% prediction interval for the certified value and includes all sources of random and systematic errors.

Notice to Users: The certification of this SRM is considered valid three years from the date of purchase.

Use: This SRM is a very thick brown-black odoriferous oil. At room temperature (23 °C), the SRM appears as a solid and when the bottle is inverted the oil will not flow. In order to mix the sample and remove sub-samples for sulfur determinations, the bottle should be heated to 60 °C. At this temperature the oil has a viscosity similar to that of SAE 50 motor oil. The bottle can then be mixed by inverting, shaking, and by swirling.

Analyses for certification were performed by W.R. Kelly and K.E. Murphy of the Inorganic Analytical Research Division. Homogeneity measurements were performed by A.F. Marlow and P.A. Pella of the Gas and Particulate Science Division.

The supplemental information reported on the next page was obtained from physical tests and measurements using ASTM methods.

The overall direction and coordination of the technical measurements leading to the certification of this SRM were coordinated through the Standard Reference Materials Program by T.E. Gills.

Gaithersburg, MD 20899
March 1, 1991

William P. Reed, Acting Chief
Standard Reference Materials Program

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## SUPPLEMENTAL INFORMATION

Physical properties of SRM 1621d are listed in the table below. The values are not certified but are provided as additional information on the matrix.

| Test | ASTM Method | Result |
|---|---|---|
| Density @ 15.6 °C (60 ° F) | D-1298 | 0.9341 |
| Flash Point | D-93 | Over + 110 °C (230 °F) |
| Pour Point, °C | D-97 | +27 °C (80.6 °F) |
| Btu Value, Gross | D-2382 | 43.87 MJ · $Kg^{-1}$ (18,860 Btu/lb) |
| Viscosity, Kinematic @ 100 °C (212 °F) | D-445 | 19.30 cSt |
| Viscosity, Kinematic @ 38 °C (100 °F) | D-445 | 391.18 cSt |

D-1298 Density, Relative Density (Specific Gravity), or API Gravity of Crude Petroleum and Liquid Petroleum Products by Hydrometer Method.

D-93 Flash Point by Pensky-Martens Closed Tester.

D-97 Pour Point of Petroleum Oils.

D-2382 Heat of Combustion of Hydrocarbon Fuels by Bomb Calorimeter (High-Precision Method).

D-445 Kinematic Viscosity of Transparent and Opaque Liquids (and the Calculation of Dynamic Viscosity).