



Standard Test Method for Refractive Index of Viscous Materials¹

This standard is issued under the fixed designation D1747; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

This standard has been approved for use by agencies of the Department of Defense.

1. Scope*

1.1 This test method covers the measurement of refractive indexes, accurate to two units in the fourth decimal place, of transparent and light-colored viscous hydrocarbon liquids and melted solids that have refractive indexes in the range between 1.33 and 1.60, and at temperatures from 80 to 100°C. Temperatures lower than 80°C can be used provided that the melting point of the sample is at least 10°C below the test temperature.

1.2 This test method is not applicable, within the accuracy stated, to liquids having colors darker than ASTM Color No. 4, ASTM color as determined by Test Method D1500, to liquids which smoke or vaporize readily at the test temperature, or to solids melting within 10°C of the test temperature.

NOTE 1—The instrument can be successfully used for refractive indices above 1.60; but since certified liquid standards for ranges above 1.60 are not yet available, the accuracy of measurement under these conditions has not been evaluated.

1.3 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.4 **Warning**—Mercury has been designated by EPA and many state agencies as a hazardous material that can cause central nervous system, kidney, and liver damage. Mercury, or its vapor, may be hazardous to health and corrosive to materials. Caution should be taken when handling mercury and mercury-containing products. See the applicable product Material Safety Data Sheet (MSDS) for details and EPA's website (<http://www.epa.gov/mercury/faq.htm>) for additional information. Users should be aware that selling mercury or mercury-containing products, or both, in your state may be prohibited by state law.

1.5 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the*

responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

2. Referenced Documents

2.1 *ASTM Standards:*²

D362 Specification for Industrial Grade Toluene³

D841 Specification for Nitration Grade Toluene

D1500 Test Method for ASTM Color of Petroleum Products (ASTM Color Scale)

D6299 Practice for Applying Statistical Quality Assurance and Control Charting Techniques to Evaluate Analytical Measurement System Performance

E1 Specification for ASTM Liquid-in-Glass Thermometers

E77 Test Method for Inspection and Verification of Thermometers

3. Terminology

3.1 *Definitions:*

3.1.1 *refractive index*—the ratio of the velocity of light (of specified wavelength) in air, to its velocity in the substance under examination. The relative index of refraction is defined as the sine of the angle of incidence divided by the sine of the angle of refraction, as light passes from air into the substance. If absolute refractive index (that is, referred to vacuum) is desired, this value should be multiplied by the factor 1.00027, the absolute refractive index of air. The numerical value of refractive index of liquids varies inversely with both wavelength and temperature.

4. Summary of Test Method

4.1 The refractive index normally is measured by the critical angle method using monochromatic light from a sodium lamp. The instrument is previously adjusted by means of calibration obtained with certified liquid standards.

¹ This test method is under the jurisdiction of ASTM Committee D02 on Petroleum Products and Lubricants and is the direct responsibility of Subcommittee D02.04.0D on Physical and Chemical Methods.

Current edition approved Oct. 1, 2009. Published October 2009. Originally approved in 1960. Last previous edition approved in 2004 as D1747–99(2004) ^{ε1}. DOI: 10.1520/D1747-09.

² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

³ Withdrawn. The last approved version of this historical standard is referenced on www.astm.org.

*A Summary of Changes section appears at the end of this standard.