



Standard Test Method for Determination of Intrinsic Stability of Asphaltene-Containing Residues, Heavy Fuel Oils, and Crude Oils (*n*-Heptane Phase Separation; Optical Detection)¹

This standard is issued under the fixed designation D7157; 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.

1. Scope*

1.1 This test method covers a procedure for quantifying the intrinsic stability of the asphaltenes in an oil by an automatic instrument using an optical device.

1.2 This test method is applicable to residual products from thermal and hydrocracking processes, to products typical of Specifications [D396](#) Grades No. 5L, 5H, and 6, and [D2880](#) Grades No. 3-GT and 4-GT, and to crude oils, providing these products contain 0.5 mass% or greater concentration of asphaltenes (see Test Method [D6560](#)).

1.3 This test method quantifies asphaltene stability in terms of state of peptization of the asphaltenes (*S*-value), intrinsic stability of the oily medium (*S*_o) and the solvency requirements of the peptized asphaltenes (*S*_a).

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

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

[D396](#) Specification for Fuel Oils

[D2880](#) Specification for Gas Turbine Fuel Oils

[D4057](#) Practice for Manual Sampling of Petroleum and Petroleum Products

[D4175](#) Terminology Relating to Petroleum, Petroleum

Products, and Lubricants

[D4177](#) Practice for Automatic Sampling of Petroleum and Petroleum Products

[D4870](#) Test Method for Determination of Total Sediment in Residual Fuels

[D6560](#) Test Method for Determination of Asphaltenes (Heptane Insolubles) in Crude Petroleum and Petroleum Products

[D6792](#) Practice for Quality System in Petroleum Products and Lubricants Testing Laboratories

3. Terminology

3.1 Definitions:

3.1.1 For definitions of some terms used in this test method, refer to Terminology [D4175](#).

3.1.2 *asphaltenes, n*—(rarely used in the singular), *in petroleum technology*, represent an oil fraction that is soluble in a specified aromatic solvent but separates upon addition of an excess of a specified paraffinic solvent.

3.1.2.1 *Discussion*—In this test method, the aromatic solvent is toluene and the paraffinic solvent is *n*-heptane.

3.1.3 *compatibility, n*—of crude oils or of heavy fuel oils, the ability of two or more crude oils or fuel oils to blend together within certain concentration ranges without evidence of separation, such as the formation of multiple phases.

3.1.3.1 *Discussion*—Incompatible heavy fuel oils or crude oils, when mixed or blended, result in the flocculation or precipitation of asphaltenes. Some oils may be compatible within certain concentration ranges in specific mixtures, but incompatible outside those ranges.

3.1.4 *flocculation, n*—of asphaltenes from crude oils or heavy fuel oils, the aggregation of colloiddally dispersed asphaltenes into visible larger masses which may or may not settle.

3.1.5 *peptization, n*—of asphaltenes in crude oils or heavy oils, the dispersion of asphaltenes to produce a colloidal dispersion.

3.1.6 *stability reserve, n*—in petroleum technology, the property of an oil to maintain asphaltenes in a peptized state and prevent flocculation of asphaltenes.

¹ This test method is under the jurisdiction of Committee [D02](#) on Petroleum Products, Liquid Fuels, and Lubricants and is the direct responsibility of Subcommittee [D02.14](#) on Stability and Cleanliness of Liquid Fuels.

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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.