



Standard Test Method for Automated Heithaus Titrimetry¹

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1. Scope

1.1 This test method describes a procedure for quantifying three Heithaus compatibility parameters that quantify the colloidal stability of asphalts and asphalt cross blends and aged asphalts.

1.2 *Units*—The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.3 *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

D8 Terminology Relating to Materials for Roads and Pavements

D3279 Test Method for Heptane Insolubles

D4124 Test Method for Separation of Asphalt into Four Fractions

D5546 Test Method for Solubility of Asphalt Binders in Toluene by Centrifuge

E169 Practices for General Techniques of Ultraviolet-Visible Quantitative Analysis

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

3.1.1 *asphaltene peptizability, n*—the tendency of asphaltenes to exist as a stable dispersion in a maltene solvent, measured by the Heithaus parameter p_a .

3.1.2 *asphalt state of peptization, n*—a measure of the ability of the combination of a maltene solvent and dispersed asphaltenes to form a stable dispersed system.

¹ This test method is under the jurisdiction of ASTM Committee D04 on Road and Paving Materials and is the direct responsibility of Subcommittee D04.47 on Miscellaneous Asphalt Tests.

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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.

3.1.3 *colloidal suspension, n*—an intimate mixture of two substances, one of which, called the dispersed phase (or colloid), is uniformly distributed in a finely divided state through the second substance, called the dispersion medium (or dispersing medium).

3.1.4 *compatibility, n*—the state of peptization of an asphalt, which is measured quantitatively by the Heithaus parameter P .

3.1.5 *dispersed phase, n*—one phase of a dispersion consisting of particles or droplets of one substance distributed through a second phase.

3.1.6 *dispersing medium, n*—one phase of a dispersion that distributes particles or droplets of another substance, the disperse phase.

3.1.7 *flocculation, n*—the process of aggregation and coalescence into a flocculent mass.

3.1.8 *Heithaus compatibility parameters, n*—three parameters: asphaltene peptizability (p_a), maltene peptizing power (p_o), and asphalt state of peptization (P), measured using Heithaus titration methods.

3.1.9 *maltene peptizing power, n*—the ability of a maltene solvent to disperse asphaltenes, measured by the Heithaus parameter p_o .

4. Summary of Test Method

4.1 Three 40 mL reaction vials are tared (Fig. 1). Three samples of asphalt of weights 0.400 g, 0.600 g and 0.800 g are transferred to each of three reaction vials. Toluene (3.000 mL) is added to each reaction vial to dissolve the asphalt constituting three solutions which differ by concentration. Each solution is titrated with isooctane (2,2,4-trimethyl pentane) to promote onset of flocculation of the solution.

4.2 Titrations are performed by placing reaction vials separately in the apparatus illustrated in Fig. 2. Each reaction vial is separately placed into a 250 mL water-jacketed reaction vessel. A sample circulation loop is made by pumping the solution through a short path length quartz flow cell housed in an ultraviolet-visible spectrophotometer then back to the reaction vial with high flow rate metering pump. A titration loop is made by pumping titrant into the sample reaction vial at a constant flow rate using a low flow rate metering pump, thus a second reaction vessel containing titrant is placed into a second 250 mL water-jacketed reaction vessel. During a titration the