



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 estimate the colloidal stability of asphalts and asphalt cross blends (1,2)², aged asphalts (3), and pyrolyzed heavy oil residua and asphalt (4) using automated Heithaus titrimetry as a stability diagnostic tool.

1.2 *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. Terminology

2.1 *Definitions of Terms Specific to This Standard:*

2.1.1 *asphalt (5)*, *n*—a dark brown to black cementitious material, solid or semisolid in consistency, in which the predominating constituents are bitumens, which occur in nature as such or are obtained as residue by refining petroleum.

2.1.2 *asphalt cross-blend*, *n*—any mixture of two or more asphalts blended together to form a consistent material.

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

2.1.4 *asphaltenes*, *n*—the high molecular weight hydrocarbon fraction precipitated from asphalt by a designated paraffinic naphtha solvent at a specified solvent-asphalt ratio.

2.1.4.1 *Discussion*—The asphaltene fraction should be identified by the solvent and solvent-asphalt ratio used.

2.1.5 *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. Equivalent to compatibility of the system.

2.1.6 *bitumen*, *n*—a class of black or dark-colored (solid, semisolid, or viscous) cementitious substances, natural or manufactured, composed principally of high-molecular weight hydrocarbons, of which asphalts, tars, pitches, and asphaltites are typical.

2.1.7 *coke*, *n*—the solid product resulting from the destruc-

tive distillation of coal, petroleum residuum, or bitumen in an oven or closed chamber, or from imperfect combustion of these materials, consisting principally of carbon.

2.1.8 *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).

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

2.1.10 *core asphalts*, *n*—the eight asphalts selected for intensive study in the Strategic Highway Research Program (SHRP).

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

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

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

2.1.14 *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.

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

2.1.16 *maltenes*, *n*—a red-brown to black heavy oil material derived from asphalt after precipitation with normal or branched alkanes (for example, *n*-pentane, *n*-hexane, *n*-heptane, isooctane, and so forth), filtration of asphaltenes, and distillation of alkane precipitating agent from the filtrate. Equivalent to deasphalted materials. Maltenes are the solvent moiety of an asphalt.

2.1.17 *oxidatively age-hardened asphalt*, *n*—an asphalt that has reacted with oxygen at elevated temperatures in an oven, usually under greater than atmospheric oxygen pressure. The reaction is run for a time sufficient to simulate asphalt aging in pavement.

2.1.18 *pyrolysis*, *n*—the breaking apart of complex molecules into simpler units by the use of heat, as in the pyrolysis of heavy oil to make gasoline.

2.1.19 *residuum*, *n*—a quantity or body of matter remaining

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 The boldface numbers in parentheses refer to the list of references at the end of this standard.