



Standard Test Method for Naphthalene Hydrocarbons in Aviation Turbine Fuels by Ultraviolet Spectrophotometry¹

This standard is issued under the fixed designation D 1840; 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 test method has been adopted for use by government agencies to replace Method 3704 of Federal Test Method Standard No. 791b.

1. Scope

1.1 This test method covers the determination, by ultraviolet spectrophotometry, of the total concentration of naphthalene, acenaphthene, and alkylated derivatives of these hydrocarbons in straight-run jet fuels containing not more than 5 % of such components and having end points below 315°C (600°F). This test method determines the maximum amount of naphthalenes that could be present.

1.2 The values stated in SI units are to be regarded as the standard. The values stated in inch-pound units are for information only.

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.* For specific precautionary statements see 8.1 and 8.2.

2. Referenced Documents

2.1 ASTM Standards:

- E 131 Terminology Relating to Molecular Spectroscopy²
- E 169 Practices for General Techniques of Ultraviolet-Visible Quantitative Analysis²
- E 275 Practice for Describing and Measuring Performance of Ultraviolet, Visible, and Near Infrared Spectrophotometers²

3. Terminology

3.1 Definitions:

3.1.1 Definitions of terms and symbols relating to absorption spectroscopy in this test method shall conform to Terminology E 131. Terms of particular significance are the following:

3.1.1.1 *radiant energy, n*—energy transmitted as electromagnetic waves.

3.1.1.2 *radiant power, P, n*—the rate at which energy is

transported in a beam of radiant energy.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *transmittance, T, n*—the molecular property of a substance that determines its transportability of radiant power expressed by

$$T = P/P_o \quad (1)$$

where:

P = radiant power passing through the sample, and

P_o = radiant power incident upon the sample.

3.2.2 *absorbance, A, n*—the molecular property of a substance that determines its ability to take up radiant power, expressed by

$$A = \log_{10} (1/T) = -\log_{10} T \quad (2)$$

where:

T = transmittance as defined in 3.2.1.

3.2.2.1 *Discussion*—It may be necessary to correct the observed transmittance (indicated by the spectrophotometer) by compensating for reflectance losses, solvent absorption losses, or refraction effects.

3.2.3 *absorptivity, a, n*—the specific property of a substance to absorb radiant power per unit sample concentration and pathlength, expressed by

$$a = A/bc \quad (3)$$

where:

A = absorbance defined in 3.2.2,

b = sample cell path length, and

c = quantity of absorbing substance contained in a unit volume of solvent.

3.2.3.1 *Discussion*—Quantitative ultraviolet analyses are based upon the absorption law, known as Beer's law. The law states that the absorbance of a homogeneous sample containing an absorbing substance is directly proportional to the concentration of the absorbing substance at a single wavelength, expressed by

$$A = abc \quad (4)$$

where:

A = absorbance as defined in 3.2.2,

a = absorptivity as defined in 3.2.3,

b = sample cell pathlength, and

¹ This test method is under the jurisdiction of ASTM Committee D-2 on Petroleum Products and Lubricants and is the direct responsibility of Subcommittee D02.04 on Hydrocarbon Analysis.

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² *Annual Book of ASTM Standards*, Vol 03.06.