



Standard Test Method for Hydrocarbon Types in Low Olefinic Gasoline by Mass Spectrometry¹

This standard is issued under the fixed designation D 2789; 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 the determination by mass spectrometry of the total paraffins, monocycloparaffins, dicycloparaffins, alkylbenzenes, indans or tetralins or both, and naphthalenes in gasoline having an olefin content of less than 3 volume % and a 95 % distillation point of less than 210°C (411°F) as determined in accordance with Test Method D 86. Olefins are determined by Test Method D 1319, or by Test Method D 875.

1.2 It has not been determined whether this test method is applicable to gasolines containing oxygenated compounds (for example, alcohols and ethers).

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:

D 86 Test Method for Distillation of Petroleum Products²

D 875 Test Method for Calculation of Olefins and Aromatics in Petroleum Distillates from Bromine Number and Acid Absorption³

D 1319 Test Method for Hydrocarbon Types in Liquid Petroleum Products by Fluorescent Indicator Adsorption²

D 2001 Test Method for Depentanization of Gasoline and Naphthas²

D 2002 Test Methods for Isolation of Representative Saturates Fraction from Low-Olefinic Petroleum Naphthas²

3. Terminology

3.1 Definitions of Terms Specific to This Standard: ⁴

3.1.1 The summations of characteristic mass fragments are defined as follows:

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 05.01.

³ Discontinued; see 1984 Annual Book of ASTM Standards, Vol 05.01.

⁴ Equations in 3.1.1 are identical to those in 11.1.

3.1.1.1

$$\Sigma 43 \text{ (paraffins)} = \text{total peak height of } m/e^+ 43 + 57 + 71 + 85 + 99. \quad (1)$$

3.1.1.2

$$\Sigma 41 \text{ (monocycloparaffins)} = \text{total peak height of } m/e^+ 41 + 55 + 69 + 83 + 97. \quad (2)$$

3.1.1.3

$$\Sigma 67 \text{ (dicycloparaffins)} = \text{total peak height of } m/e^+ 67 + 68 + 81 + 82 + 95 + 96 \quad (3)$$

3.1.1.4

$$\Sigma 77 \text{ (alkylbenzenes)} = \text{total peak height of } m/e^+ 77 + 78 + 79 + 91 + 92 + 105 + 106 + 119 + 120 + 133 + 134 + 147 + 148 + 161 + 162. \quad (4)$$

3.1.1.5

$$\Sigma 103 \text{ (indans and tetralins)} = \text{total peak height of } m/e^+ 103 + 104 + 117 + 118 + 131 + 132 + 145 + 146 + 159 + 160. \quad (5)$$

3.1.1.6

$$\Sigma 128 \text{ (naphthalenes)} = \text{total peak height of } m/e^+ 128 + 141 \pm 142 + 155 + 156. \quad (6)$$

3.1.1.7

$$T = \text{total ion intensity} = \Sigma 41 + \Sigma 43 + \Sigma 67 + \Sigma 77 + \Sigma 103 + \Sigma 128. \quad (7)$$

3.2 *carbon number*, by definition, is the average number of carbon atoms in the sample.

3.3 A mass number with a plus sign as superscript is defined as the peak height associated with the same mass number.

4. Summary of Test Method

4.1 Samples are analyzed by mass spectrometry, based on the summation of characteristic mass fragments, to determine the concentration of the hydrocarbon types. The average number of carbon atoms of the sample is estimated from spectral data. Calculations are made from calibration data which are dependent upon the average number of carbon atoms of the sample. Results are expressed in liquid volume percent.

5. Significance and Use

5.1 A knowledge of the hydrocarbon composition of gasoline process streams, blending stocks and finished motor