



Standard Test Method for Estimation of Hydrogen Content of Aviation Fuels¹

This standard is issued under the fixed designation D3343; 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 standard has been approved for use by agencies of the Department of Defense.

1. Scope

1.1 This test method covers the estimation of the hydrogen content (mass percent) of aviation gasolines and aircraft turbine and jet engine fuels.

1.2 This test method is empirical and is applicable to liquid hydrocarbon fuels that conform to the requirements of specifications for aviation gasolines or aircraft turbine and jet engine fuels of types Jet A, Jet A-1, Jet B, JP-4, JP-5, JP-7, and JP-8.

NOTE 1—The procedure for the experimental determination of hydrogen in petroleum fractions is described in Test Methods [D1018](#) and [D3701](#).

NOTE 2—The estimation of the hydrogen content of a hydrocarbon fuel is justifiable only when the fuel belongs to a well-defined class for which a relationship among the hydrogen content and the distillation range, density, and aromatic content has been derived from accurate experimental measurements on representative samples of that class. Even in this case, the possibility that the estimates may be in error by large amounts for individual fuels should be recognized. The fuels used to establish the correlation presented in this test method are defined by the following specifications:

Fuel	Specification
Aviation gasolines	D910
Aircraft turbine and jet engine fuels	
JP-4 and JP-5	MIL-T-5624
JP-6	MIL-J-25056 (Obsolete)
JP-7	MIL-T-38219
Jet A	D1655
Miscellaneous hydrocarbons	
No. 2 Diesel fuel	
Kerosine distillates (similar to Jet A)	
Miscellaneous (includes thinners, gasoline fractions, and unidentified blends)	
Special production fuels (commercial products of nearly pure hydrocarbons and special high-temperature fuels (HTF) produced for Air Force tests.	
Pure hydrocarbons	

1.3 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

1.4 *This standard does not purport to address 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

[D86](#) Test Method for Distillation of Petroleum Products at Atmospheric Pressure

[D910](#) Specification for Aviation Gasolines

[D1018](#) Test Method for Hydrogen in Petroleum Fractions

[D1298](#) Test Method for Density, Relative Density (Specific Gravity), or API Gravity of Crude Petroleum and Liquid Petroleum Products by Hydrometer Method

[D1319](#) Test Method for Hydrocarbon Types in Liquid Petroleum Products by Fluorescent Indicator Adsorption

[D1655](#) Specification for Aviation Turbine Fuels

[D2887](#) Test Method for Boiling Range Distribution of Petroleum Fractions by Gas Chromatography

[D3701](#) Test Method for Hydrogen Content of Aviation Turbine Fuels by Low Resolution Nuclear Magnetic Resonance Spectrometry

2.2 Military Standards:

[MIL-T-5624](#) Specification for Turbine Fuel, Aviation, Grade JP-4 and JP-5³

[MIL-J-25056](#) Specification for Turbine Fuel, Grade JP-6³

[MIL-T-38219](#) Specification for Turbine Fuel, Low Volatility, JP-7³

3. Summary of Test Method

3.1 A correlation⁴ has been established between the hydrogen content of a fuel and its distillation range, API gravity, and aromatic content. This relationship is given by the following equations:

Type fuel—All aviation gasolines and aircraft turbine fuels

$$\begin{aligned} \% \text{ H} = & 0.063\,17G - 0.041\,089A + 0.000\,072\,135AV \\ & + 0.000\,056\,84GV - 0.000\,496\,0GA + 10.56 \end{aligned} \quad (1)$$

¹ This test method is under the jurisdiction of ASTM Committee [D02](#) on Petroleum Products and Lubricants and is the direct responsibility of Subcommittee [D02.04.0K](#) on Correlative Methods.

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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 Available from Standardization Documents, Order Desk, Bldg. 4, Section D, 700 Robbins Ave., Philadelphia, PA 19111-5094, ATTN: NPODS.

⁴ Bert, J. A., and Painter, L. J., "Method for Calculating Hydrogen Content of Aviation Fuels," Chevron Research Co., Richmond, CA, Jan. 12, 1973.