



Designation: D7675 – 22

Standard Test Method for Determination of Total Hydrocarbons in Hydrogen by FID- Based Total Hydrocarbon (THC) Analyzer¹

This standard is issued under the fixed designation D7675; 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 describes a procedure for total hydrocarbons (THC's) measurement in hydrogen intended as a fuel on a methane (C_1) basis. The determination of THC on a C_1 basis is an analytical technique where all the hydrocarbons are assumed to have the same response as methane (CH_4). Sensitivity from 0.1 parts per million by volume (ppm(v), $\mu\text{mol/mol}$) up to 1000 ppm(v) concentration is achievable. Higher concentrations can be analyzed using appropriate dilution techniques. This test method can be applied to other gaseous samples requiring analysis of trace constituents provided an assessment of potential interferences has been accomplished.

1.2 This test method is a Flame Ionization Detector-based (FID-based) hydrocarbon analysis method without the use of separation columns. Therefore, this method does not provide speciation of individual hydrocarbons. Several varieties of instruments are manufactured and can be used for this method.

1.2.1 This method provides a measure of THC “as CH_4 ,” because all hydrocarbon species are quantified the same as CH_4 response, which is the sole species used for calibration. Magnitude of the FID response to an atom of carbon is dependent on the chemical environment of this atom in the molecule. This method provides the THC result as if all carbon atoms are from aliphatic, aromatic, olefinic, or acetylenic compounds, where the detector response caused by these atoms is approximately relative to the number of carbon atoms present in the molecule. Other types of molecules, including those containing oxygen or chlorine atoms, will respond differently and usually much lower than the corresponding aliphatic hydrocarbon. Therefore, other methods (Test Methods [D7653](#), [D7892](#), or equivalent) must be utilized to determine the exact constituents of the THC response determined by this method.

1.3 The proper handling of compressed gas cylinders containing air, nitrogen, hydrogen, or helium requires the use of gas regulators to preclude over-pressurization of any instrument component

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

1.5 *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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.6 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards*:²

[D4150 Terminology Relating to Gaseous Fuels](#)

[D7653 Test Method for Determination of Trace Gaseous Contaminants in Hydrogen Fuel by Fourier Transform Infrared \(FTIR\) Spectroscopy](#)

[D7606 Practice for Sampling of High Pressure Hydrogen and Related Fuel Cell Feed Gases](#)

[D7892 Test Method for Determination of Total Organic Halides, Total Non-Methane Hydrocarbons, and Formaldehyde in Hydrogen Fuel by Gas Chromatography/Mass Spectrometry](#)

2.2 *EPA Standard*:³

[40 CFR Part 136 Appendix B: Definition and Procedure for the Determination of the Method Detection Limit](#)

¹ This test method is under the jurisdiction of ASTM Committee [D03](#) on Gaseous Fuels and is the direct responsibility of Subcommittee [D03.14](#) on Hydrogen and Fuel Cells.

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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 United States Environmental Protection Agency (EPA), William Jefferson Clinton Bldg., 1200 Pennsylvania Ave., NW, Washington, DC 20460, <http://www.epa.gov>.