



Standard Test Method for Determination of Total Organic Halides, Total Non-Methane Hydrocarbons, and Formaldehyde in Hydrogen Fuel by Gas Chromatography/Mass Spectrometry¹

This standard is issued under the fixed designation D7892; 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 The gas chromatography/mass spectrometry (GC/MS) procedure described in this method is used to determine concentrations of total organic halides and total non-methane hydrocarbons (TNMHC) by measurement of individual target halocarbons ([Table 1](#)) and hydrocarbons (including formaldehyde, [Table 1](#) and [Table 2](#)), respectively. Measurement of these substances is required for application of SAE J2719 to hydrogen fuel quality where this fuel is intended for use in fuel cell vehicles. SAE 2719 states hydrogen fuel is expected to contain less than 0.05 μmole/mole total halogenates (including organic halides), 2 μmole/mole total non-methane hydrocarbons (C1 Basis, [3.2.16](#)) and 0.01 μmole/mole formaldehyde.

1.2 Based upon the GC/MS/full scan analysis of a 400 mL hydrogen sample, the reporting limit (RL) is 0.001 μmole/mole for each target compound listed in [Table 1](#) and [Table 2](#), with the exception of 0.002 μmole/mole for ethane and 0.002 μmole/mole for ethene.

1.3 Mention of trade names in this standard does not constitute endorsement or recommendation for use. Other manufacturers' equipment or equipment models can be used.

1.4 The values stated in SI units are to be regarded as 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 and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*²

[D4150 Terminology Relating to Gaseous Fuels](#)

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

2.2 *Other Standards:*³

[SAE J2719 Information Report on the Development of a Hydrogen Quality Guideline for Fuel Cell Vehicles](#)

3. Terminology

3.1 *Definitions*—For definitions of terms use in this test method, refer to Terminology [D4150](#).

3.2 *Definitions:*

3.2.1 *absolute pressure*—pressure measured with reference to absolute zero pressure usually expressed as kPa, mm Hg, bar or psi.

3.2.2 *constituent*—component (or compound) found within a hydrogen fuel mixture.

3.2.3 *contaminant*—contaminant as defined in this application is an impurity that adversely affects the components within a fuel cell system or hydrogen storage system.

3.2.4 *cryogen*—a refrigerant is used to obtain very low temperatures. The cryogen used in this method is liquid nitrogen (bp -196 °C).

3.2.5 *dynamic calibration*—Calibration of an analytical system uses gaseous calibration standard generated by diluting a known concentration of compressed gaseous standard with a diluent gas.

3.2.6 *fuel cell grade hydrogen*—hydrogen satisfying the specifications in SAE J2719.

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 SAE International (SAE), 400 Commonwealth Dr., Warrendale, PA 15096, <http://www.sae.org>.