



Designation: D7845 – 17

Standard Test Method for Determination of Chemical Species in Marine Fuel Oil by Multidimensional Gas Chromatography/Mass Spectrometry¹

This standard is issued under the fixed designation D7845; 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 quantitative determination of a variety of chemical species in marine fuel oil (bunker fuel oil) by gas chromatography/mass spectrometry. By using the same conditions and by selecting required mass spectral selected ions, the test method may be used for the determination of other species than those for which precision statements and limits of detection have been established.

1.2 An example list of chemical species for which a limit of quantification has been determined by means of this test method is given in [Table 1](#).

1.3 Other refinery hydrocarbon fractions and their mixtures may be tested using the same test method conditions. However, the precision of this test method reflects the compounds in [Table 1](#).

1.4 Results are reported to the nearest 1.0 mg/kg.

1.5 The values stated in SI units are to be regarded as standard.

1.5.1 *Exception*—Non-SI values are given for psig.

1.6 *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

[D4307 Practice for Preparation of Liquid Blends for Use as Analytical Standards](#)

¹ This test method is under the jurisdiction of ASTM Committee [D02](#) on Petroleum Products, Liquid Fuels, and Lubricants and is the direct responsibility of Subcommittee [D02.04.0M](#) on Mass Spectroscopy.

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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.

[D6299 Practice for Applying Statistical Quality Assurance and Control Charting Techniques to Evaluate Analytical Measurement System Performance](#)

2.2 *Other Standards*:

[ISO 8217:2010 Petroleum Products—Fuels \(Class F\)—Specifications of Marine Fuels](#)³

3. Terminology

3.1 *Definitions*:

3.1.1 *direct or open split interface, n*—any GC/MS interface used to maintain atmospheric pressure at capillary column outlet.

3.1.2 *reconstructed ion chromatogram (RIC), n*—a limited mass chromatogram representing the intensities of ion mass spectrometric currents for only those ions having particular mass to charge ratios used in this test method to selectively extract and identify components in the presence of a complex hydrocarbon matrix.

3.1.3 *total ion chromatogram (TIC), n*—mass spectrometer computer output representing either the summed intensities of all scanned ion currents or a sample of the current in the ion beam for each spectrum scan plotted against the corresponding spectrum number.

3.1.4 *wall coated open tubular (WCOT), n*—a type of capillary column prepared by coating or bonding the inside wall of the capillary with a thin film of stationary phase.

4. Summary of Test Method

4.1 A suitable internal standard, ethylbenzene d-10 is added to the sample, which is then introduced into a gas chromatograph equipped with two columns configured with a Deans switching system between the two columns. The sample first passes through the polydimethylsiloxane (WCOT) pre-column which then performs a separation of the light hydrocarbon fraction and eliminates the high boiling hydrocarbon fraction to vent. The compounds of interest and internal standard are transferred to the high resolution polydimethylsiloxane (WCOT) analytical column for chromatographic separation.

³ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.

*A Summary of Changes section appears at the end of this standard