



Designation: D8369 – 21

Standard Test Method for Detailed Hydrocarbon Analysis by High Resolution Gas Chromatography with Vacuum Ultraviolet Absorption Spectroscopy (GC-VUV)¹

This standard is issued under the fixed designation D8369; 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 use of gas chromatography and vacuum ultraviolet absorption spectroscopy (GC-VUV) for the determination of individual compounds and compound classes by percent mass or percent volume with a final boiling point as defined by Test Method **D86** up to 225 °C.

1.1.1 Typical products encountered in petroleum refining or biofuel operations, such as blend stocks; naphthas, reformates, alkylates, FCC gasoline, liquefied petroleum gas (LPG), alcohols and ethers may be analyzed.

1.1.2 Spark-ignition engine fuels including those with commonly blended oxygenates may also be analyzed.

1.2 Individual compounds are spectrally verified and speciated. Compounds that are not spectrally verified and speciated are identified by carbon number, based on retention index, and by class type, based on spectral response. The resulting verified hydrocarbon analysis therefore identifies, classifies, and reports 100 % of the spectral responses.

1.2.1 This test method may not be applicable to all concentrations of individual hydrocarbons; the user must evaluate the spectral response of the hydrocarbon of interest, the amount and proximity of co-eluting hydrocarbons, and detector saturation. Quantitation of individual hydrocarbons with concentrations less than 0.1 % or greater than 30 % by mass may require validation.

1.2.2 This test method can be used to determine methanol in the range of 0.05 % to 3 % by mass, ethanol in the range of 0.05 % to 25 % by mass, butanols in the range of 0.5 % to 10 % by mass, methyl t-butyl ether (MTBE) in the range of 0.5 % to 22 % by mass, ethyl t-butyl ether (ETBE) in the range of 0.5 % to 22 % by mass, and t-amyl methyl ether (TAME) in the range of 0.5 % to 22 % by mass in spark-ignition engine fuels.

NOTE 1—Applicable ranges of individual components and precision will ultimately be defined by an interlaboratory study.

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 **D02.04.01** on Gas Chromatography Methods.

Current edition approved April 1, 2021. Published May 2021. DOI: 10.1520/D8369-21.

1.2.3 Other compounds containing oxygen, sulfur, nitrogen, and so forth, may also be present, and may co-elute with the hydrocarbons. If determination of other specific compounds is required, supplementation of the spectral library may be necessary.

1.3 Class-type composition – paraffins, iso-paraffins, olefins, naphthenes, aromatics and oxygenates are reported. The class composition totals are the sum of speciated individual compounds and spectrally classed compounds.

1.3.1 The class types may optionally be sub classed by carbon number.

1.3.2 Olefins may optionally be sub classed into mono-olefins, non-conjugated diolefins, conjugated diolefins, and cyclic olefins.

1.3.3 Aromatics may optionally be sub classed into mono-aromatics, diaromatics, and naphtheno-aromatics (indans and indenenes).

NOTE 2—Interim precision for optional sub class reporting is not determined.

1.4 Individual compounds may not be baseline-separated by the procedure described in this method; that is, some compounds will coelute. The coelutions are resolved at the detector using VUV absorbance spectra and deconvolution algorithms.

1.5 This test method is intended as a type of detailed hydrocarbon analysis (DHA). Incorporation of the GC-VUV data report into commercial DHA software packages with subsequent physical and chemical property calculations and correlations is the responsibility of the DHA software vendor.

1.6 Temporary precision has been determined on a limited subset of samples and compounds given in Table 6 and Table 7.

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

1.8 *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.*