



Designation: D8519 – 23

Standard Test Method for Determination of Hydrocarbon Types in Waste Plastic Process Oil Using Gas Chromatography with Vacuum Ultraviolet Absorption Spectroscopy Detection (GC-VUV)¹

This standard is issued under the fixed designation D8519; 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 a standard procedure for the determination of hydrocarbon types (saturates, olefins, styrenes, aromatics and polyaromatics) of waste plastic process oil (WPPO) from chemical or thermal processes using gas chromatography and vacuum ultraviolet absorption spectroscopy detection (GC-VUV).

1.1.1 This test method is applicable for plastic recycling and circular schemes including wide range density material from polyethylene and polypropylene.

1.1.2 The test method is applicable to waste plastic process oil having a final boiling point of 545 °C or lower at atmospheric pressure as measured by this test or Test Method **D2887**. This test method is limited to samples having a boiling range greater than 36 °C, and having a vapor pressure sufficiently low to permit sampling at ambient temperature.

1.1.3 WPPOs with initial boiling points less than nC5 (36 °C) and final boiling point less than nC15 (271 °C) may be analyzed by Test Method **D8369**.

1.1.4 **Appendix X3** is applicable to waste plastic process oils that are predominantly hydrocarbons in the boiling range of pentane, nC5 (36 °C) to tetrahexacontane, nC64 (629 °C).

1.2 Concentrations of group type totals are determined by percent mass or percent volume. The applicable working ranges are as follows:

Total Aromatics	%Mass	1 to 50
Monoaromatics	%Mass	1 to 50
Diaromatics	%Mass	1 to 15
Tri-plus aromatics	%Mass	0.5 to 5
PAH	%Mass	0.5 to 15
Saturates	%Mass	5 to 99
Olefins	%Mass	1 to 80
Conjugated diolefins	%Mass	0.2 to 5
Styrenes	%Mass	0.2 to 5

The final precision concentration ranges will be defined by a future ILS.

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 July 1, 2023. Published August 2023. DOI: 10.1520/D8519-23.

1.2.1 Saturates totals are the result of the summation of normal paraffins, isoparaffins, and naphthenes.

1.2.2 Aromatics are the summation of monoaromatic and polyaromatic group types. Polyaromatic totals are the result of the summation of diaromatic and tri-plus aromatic group types.

1.2.3 Olefin totals are the result of the sum of mono-olefins, conjugated diolefins, non-conjugated diolefins, and cyclic olefins.

1.2.4 Styrenes totals are the sum of styrene and alkylated styrenes. Styrenes are classified separately, neither as aromatic nor olefin.

1.3 Waste plastic process oil containing mixed plastic types such as polyethylene terephthalate PET and polyvinyl chloride or other material may yield compounds including hetero-compounds that are not speciated by this test method.

1.4 Individual components are typically not baseline separated by the procedure described in this test method. The coelutions are resolved at the detector using VUV absorbance spectra and deconvolution algorithms.

1.5 This test method may apply to other process oils from sources such as tires and bio-mass boiling between pentane (36 °C) and tetrahexacontane (545 °C), but has not been extensively tested for such applications.

1.6 **Units**—The values stated in SI units are to be regarded as standard. No other units of measurement, other than the boiling point of normal paraffins (°F) in Table 2 and Table X.3.1, are included in this standard.

1.7 *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.*

1.8 *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.*