



Designation: D8351 – 22

Standard Test Method for Determination of Trace Elements in Biodiesel and Biodiesel Blends by Microwave Plasma Atomic Emission Spectrometry (MP-AES)¹

This standard is issued under the fixed designation D8351; 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 determination of elements in biodiesel and biodiesel blends by microwave plasma atomic emission spectrometry (MP-AES). The specific elements within the scope of this method are calcium (Ca), magnesium (Mg), phosphorus (P), potassium (K), and sodium (Na).

1.2 This test method conforms to Practice D6300, subsection 8.4.5, valid test result range, and subsection 8.4.6, working range specifications. The valid test result range and working range are recent additions to Practice D6300, and a graphical representation using example values is shown in Appendix X2, Test Method Operating Range.

1.3 Method working range:

high expected concentration limit = highest ILS sample mean

low expected concentration limit = lowest ILS sample mean if:

lowest ILS sample mean – $R_{\text{lowest ILS sample mean}} > 0$; otherwise it is

determined by solving for X using the following equation:

$X - R_x = \text{coarsest resolution, determined by } 0.5 \cdot \sigma_{r \text{ lowest ILS sample mean}}$

Biodiesel and Biodiesel Blends	
Element	Method Working Range (expected mg/kg)
Calcium	0.24 to 15.01
Magnesium	0.12 to 11.55
Phosphorus	1.69 to 14.24
Potassium	0.49 to 13.98
Sodium	0.90 to 14.30

1.4 This test method uses organic elemental standards in organic solvents for calibration and does not purport to quantitatively determine insoluble particulates. Analytical results are particle size dependent, and particles larger than a few micrometers can cause results to appear low.

1.5 Elements present at mass fractions above the upper limit of the calibration curves can be determined with additional appropriate dilutions. Elements shall be measured at the wavelengths presented in Table 1. Alternate wavelengths noted in Appendix X1 may be used in the rare case of spectral interference.

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 D02.03 on Elemental Analysis.

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1.6 The values stated in SI units are to be regarded as standard. No other units of measurement 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.*

2. Referenced Documents

2.1 ASTM Standards:²

D4057 Practice for Manual Sampling of Petroleum and Petroleum Products

D4177 Practice for Automatic Sampling of Petroleum and Petroleum Products

D4307 Practice for Preparation of Liquid Blends for Use as Analytical Standards

D6299 Practice for Applying Statistical Quality Assurance and Control Charting Techniques to Evaluate Analytical Measurement System Performance

D6300 Practice for Determination of Precision and Bias Data for Use in Test Methods for Petroleum Products, Liquid Fuels, and Lubricants

D6792 Practice for Quality Management Systems in Petroleum Products, Liquid Fuels, and Lubricants Testing Laboratories

D7372 Guide for Analysis and Interpretation of Proficiency Test Program Results

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.