



Designation: D8213 – 18

Standard Test Method for Determination of Boron in Coal¹

This standard is issued under the fixed designation D8213; 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 reappraisal. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reappraisal.

1. Scope

1.1 This test method describes a procedure for the analysis of total boron in coal.

1.2 *Units*—The values stated in SI units are to be regarded as standard. The values given in parentheses after SI units are provided for information only and are not considered standard.

1.3 *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.*

1.4 *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

D121 Terminology of Coal and Coke

D1193 Specification for Reagent Water

D2013 Practice for Preparing Coal Samples for Analysis

D3180 Practice for Calculating Coal and Coke Analyses from As-Determined to Different Bases

D5865 Test Method for Gross Calorific Value of Coal and Coke

D6349 Test Method for Determination of Major and Minor Elements in Coal, Coke, and Solid Residues from Combustion of Coal and Coke by Inductively Coupled Plasma—Atomic Emission Spectrometry

D6357 Test Methods for Determination of Trace Elements in Coal, Coke, and Combustion Residues from Coal Utilization Processes by Inductively Coupled Plasma Atomic

Emission Spectrometry, Inductively Coupled Plasma Mass Spectrometry, and Graphite Furnace Atomic Absorption Spectrometry
E144 Practice for Safe Use of Oxygen Combustion Vessels
E177 Practice for Use of the Terms Precision and Bias in ASTM Test Methods
E691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method

2.2 SAI Standard:³

AS 1038.10.3 Coal and Coke—Analysis and Testing, Part 10.3: Determination of Trace Elements—Coal and Coke—Determination of Boron Content—ICP-AES Method

3. Terminology

3.1 *Definitions*—Definitions applicable to these test methods are listed in Terminology D121.

4. Summary of Test Method

4.1 Total boron is determined following one of five test preparation procedures:

4.1.1 *Procedure A*—The coal or coke to be analyzed is combusted in a vessel with dilute nitric acid absorbing the boron vapors. The combustion vessel is rinsed into a vessel with dilute nitric acid.

4.1.2 *Procedure B*—The coal or coke to be analyzed is ashed under controlled conditions. The residue is digested by aqua-regia, and dissolved in 1 % nitric acid.

4.1.3 *Procedure C*—The coal or coke to be analyzed is ashed under controlled conditions. The residue is digested in a mixture of hydrofluoric, nitric, and hydrochloric acids.

4.1.4 *Procedure D*—Following AS 1038.10.3, the coal or coke to be analyzed is ignited at 800 °C with Eschka mixture. The residue is dissolved in dilute hydrochloric acid.

4.1.5 *Procedure E*—The coal or coke to be analyzed is digested using a microwave system following manufacturer's recommendation for temperatures, power, and time, using either the acid mixtures specified in Test Methods D6357 or Test Method D6349, depending upon instrument capabilities.

4.1.6 Combustion residues are digested on an as-received basis.

¹ This test method is under the jurisdiction of ASTM Committee D05 on Coal and Coke and is the direct responsibility of Subcommittee D05.29 on Major Elements in Ash and Trace Elements of Coal.

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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 SAI Global, Level 37, 680 George Street, Sydney NSW 2000, Australia, <https://www.saiglobal.com/>.