



Standard Test Methods for Nitrogen in the Analysis Sample of Coal and Coke¹

This standard is issued under the fixed designation D 3179; 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 These test methods cover the determination of total nitrogen in samples of coal and coke. The analytical data from these test methods shall be reported as part of ultimate analysis where ultimate analysis is requested. If ultimate analysis is not requested, the value shall be reported according to the request. Two methods are included as follows:

	Sections
Test Method A—Kjeldahl-Gunning Macro Analysis, with an alternative technique included	9 to 16
Test Method B—Kjeldahl-Gunning Semi-Micro Determination	17 to 23

1.2 *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.*

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

2. Referenced Documents

2.1 ASTM Standards:

- D 121 Terminology of Coal and Coke²
- D 346 Practice for Collection and Preparation of Coke Samples for Laboratory Analysis²
- D 1193 Specification for Reagent Water³
- D 2013 Method of Preparing Coal Samples for Analysis²
- D 3173 Test Method for Moisture in the Analysis Sample of Coal and Coke²
- D 3176 Practice for Ultimate Analysis of Coal and Coke²
- D 3180 Practice for Calculating Coal and Coke Analyses from As-Determined to Different Bases²
- E 380 Practice for Use of the International System of Units (SI) (the Modernized Metric System)⁴

3. Terminology

3.1 For definitions of terms used in these test methods, refer to Definitions D 121. For an explanation of the metric system

including units, symbols, and conversion factors, see Practice E 380.

4. Summary of Test Methods

4.1 In these procedures, nitrogen is converted into ammonium salts by destructive digestion of the sample with a hot, catalyzed mixture of concentrated sulfuric acid and potassium sulfate. These salts are subsequently decomposed in a hot alkaline solution from which the ammonia is recovered by distillation and finally determined by alkalimetric or acidimetric titration.

5. Significance and Use

5.1 Nitrogen results obtained by these test methods are required to fulfill the requirements of the ultimate analysis, Test Method D 3173. Also, results obtained may be used to evaluate the potential formation of nitrogen oxides as a source of atmospheric pollution.

5.2 Nitrogen data are used in comparing coals and in research. When the oxygen content of coal is estimated by difference, it is necessary to make a nitrogen determination.

6. Interferences

6.1 No significant interferences have been determined using these procedures. However, strict adherence is necessary when using these nitrogen procedures to obtain good reproducible results.

7. Reagents

7.1 *Purity of Reagents*—Reagent grade chemicals shall be used in all tests. Unless otherwise indicated, it is intended that all reagents shall conform to the specifications of the Committee on Analytical Reagents of the American Chemical Society, where such specifications are available.⁵ Other grades may be used, provided it is first ascertained that the reagent is of sufficient purity to meet its use without lessening the accuracy of the determination.

7.2 *Water*—Unless otherwise indicated, references to water shall be understood to mean Type II reagent water, conforming to Specification D 1193.

¹ These test methods are under the jurisdiction of ASTM Committee D-5 on Coal and Coke and are the direct responsibility of Subcommittee D05.21 on Methods of Analysis.

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² *Annual Book of ASTM Standards*, Vol 05.05.

³ *Annual Book of ASTM Standards*, Vol 11.01.

⁴ *Annual Book of ASTM Standards*, Vol 14.02. Excerpts appear in the gray pages of all the volumes.

⁵ *Reagent Chemicals, American Chemical Society Specifications*, American Chemical Society, Washington, DC. For suggestions on the testing of reagents not listed by the American Chemical Society, see *Anal. Standards for Laboratory Chemicals*, BDH Ltd., Poole, Dorset, U.K., and the *United States Pharmacopeia and National Formulary*, U.S. Pharmaceutical Convention, Inc. (USPC), Rockville, MD.