



Standard Test Method for Total Fluorine in Coal and Coke by Pyrohydrolytic Extraction and Ion Selective Electrode or Ion Chromatograph Methods¹

This standard is issued under the fixed designation D5987; 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 analysis of total fluorine in coal and coke.

1.2 This analysis was successfully tested on coals containing 37 % ash or less (see AS 1038.10.4 and Conrad²).

1.3 The values stated in SI units shall be regarded as standard. The values given in parentheses are for information only.

1.4 *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.* For specific hazard statements see [Note 4](#).

1.5 All accountability and quality control aspects of Guide [D4621](#) apply to this test method.

2. Referenced Documents

2.1 ASTM Standards:³

[D346](#) Practice for Collection and Preparation of Coke Samples for Laboratory Analysis

[D1193](#) Specification for Reagent Water

[D2013](#) Practice for Preparing Coal Samples for Analysis

[D2234/D2234M](#) Practice for Collection of a Gross Sample of Coal

[D3174](#) Test Method for Ash in the Analysis Sample of Coal and Coke from Coal

[D3180](#) Practice for Calculating Coal and Coke Analyses

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 Conrad, V. B., and Brownlee, W. D., “Hydrolytic—Ion Chromatographic Determination of Fluoride in Coal and Geological Materials,” *Analytical Chemistry*, Vol 60, No. 4, 1988, pp. 365–369.

³ 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.

from As-Determined to Different Bases

[D4621](#) Guide for Quality Management in an Organization That Samples or Tests Coal and Coke (Withdrawn 2010)⁴

[D5142](#) Test Methods for Proximate Analysis of the Analysis Sample of Coal and Coke by Instrumental Procedures (Withdrawn 2010)⁴

2.2 *Australian Standard*.⁵

[AS 1038.10.4](#) Determination of Trace Elements—Coal, Coke and Fly-Ash—Determination of Fluorine Content—Pyrohydrolysis Method

3. Summary of Test Method

3.1 Total fluorine is determined in this test method by first subjecting the weighed test portion to pyrohydrolytic conditions which separate fluorine from the coal/coke matrix. The pyrohydrolysate is then gravimetrically processed and final determinations are made by either ion-selective electrode or ion chromatographic techniques.

4. Significance and Use

4.1 This test method permits measurement of the fluorine content of coal and coke for the evaluation of potential fluorine emission from coal combustion or conversion processes. When coal samples are combusted in accordance with this test method, the fluorine is quantitatively released from the coal and retained in the pyrohydrolysate so that it is representative of the total fluorine concentration in coal.

5. Apparatus

5.1 *Laboratory Ware*—Except as noted, all laboratory ware, for example, volumetric flasks, beakers, bottles, etc., used for solutions containing fluoride ions must be made of polyethylene, polystyrene, or a heat-resistant polymer such as polypropylene.

5.2 *Vials*—Glass or polystyrene, 10 to 30-mL capacity with tightly fitting snap-on plastic lids.

⁴ The last approved version of this historical standard is referenced on www.astm.org.

⁵ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036.