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# Standard Test Method for Gross Calorific Value of Coal and Coke[1]

This standard is issued under the fixed designation D 5865; 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 pertains to the determination of the gross calorific value of coal and coke by either an isoperibol or adiabatic bomb calorimeter.

1.2 The values stated in SI units are regarded as the 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 and health practices and determine the applicability of regulatory limitations prior to use.* Specific hazard statements are given in Section 8.

## 2. Referenced Documents

2.1 *ASTM Standards:* [2]

D 121 Terminology of Coal and Coke
D 346 Practice for Collection and Preparation of Coke Samples for Laboratory Analysis
D 388 Classification of Coals by Rank
D 1193 Specification for Reagent Water
D 2013 Practice for Preparing Coal Samples for Analysis
D 3173 Test Method for Moisture in the Analysis Sample of Coal and Coke
D 3177 Test Method for Total Sulfur in the Analysis Sample of Coal and Coke
D 3180 Practice for Calculating Coal and Coke Analyses from As-Determined to Different Bases
D 4239 Test Methods for Sulfur in the Analysis Sample of Coal and Coke Using High-Temperature Tube Furnace Combustion Methods
D 5142 Test Methods for Proximate Analysis of the Analysis Sample of Coal and Coke by Instrumental Procedures
E 1 Specification for ASTM Thermometers
E 144 Practice for Safe Use of Oxygen Combustion Bombs
E 178 Practice for Dealing with Outlying Observations

## 3. Terminology

3.1 *Definitions:*

3.1.1 *adiabatic calorimeter*—a calorimeter that operates in the adiabatic mode and may or may not use a microprocessor. The initial temperature before initiating the combustion and the final temperatures are recorded by the operator or the microprocessor.

3.1.2 *automated calorimeter* —a calorimeter which has a microprocessor that takes the thermometric readings and calculates the Calibration Value and the Heat of Combustion Values.

3.1.3 *calorific value*—the heat produced by combustion of a unit quantity of a substance under specified conditions.

3.1.4 *calorimeter*—a device for measuring calorific value consisting of a bomb, its contents, a vessel for holding the bomb, temperature measuring devices, ignition leads, water, stirrer, and a jacket maintained at specified temperature conditions.

3.1.5 *gross calorific value (gross heat of combustion at constant volume),* $Q_v$ (gross)—the heat produced by complete combustion of a substance at constant volume with all water formed condensed to a liquid.

3.1.6 *heat of formation*—the change in heat content resulting from the formation of 1 mole of a substance from its elements at constant pressure.

3.1.7 *isoperibol calorimeter*—a calorimeter that operates in the isoperibol mode and uses a microprocssor to record the initial and final temperatures and make the appropiate heat leak corrections during the temperature rise. It determines when the calorimeter is in equilibrium and ignites the sample and determines when the calorimeter has reached equilibrium after ignition.

3.1.8 *net calorific value (net heat of combustion at constant pressure),* $Q_p$ (net)—the heat produced by combustion of a substance at a constant pressure of 0.1 MPa (1 atm), with any water formed remaining as vapor.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *corrected temperature rise*—the calorimeter temperature change caused by the process that occurs inside the bomb corrected for various effects.

[1] This test method is under the jurisdiction of ASTM Committee D05 on Coal and Coke and is the direct responsibility of Subcommittee D05.21 on Methods of Analysis.

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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.

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