



Designation: D 5865 – 02

Standard Test Method for Gross Calorific Value of Coal and Coke¹

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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:

- D 121 Terminology of Coal and Coke²
- D 346 Practice for Collection and Preparation of Coke Samples for Laboratory Analysis²
- D 388 Classification of Coals by Rank²
- D 1193 Specification for Reagent Water³
- D 2013 Practice for Preparing Coal Samples for Analysis²
- D 3173 Test Method for Moisture in the Analysis Sample of Coal and Coke²
- D 3177 Test Method for Total Sulfur in the Analysis Sample of Coal and Coke²
- D 3180 Practice for Calculating Coal and Coke Analyses from As-Determined to Different Bases²
- D 4239 Test Methods for Sulfur in the Analysis Sample of Coal and Coke Using High Temperature Tube Furnace Combustion Methods²
- D 5142 Test Methods for Proximate Analysis of the Analysis Sample of Coal and Coke by Instrumental Procedures²
- E 1 Specification for ASTM Thermometers⁴
- E 144 Practice for Safe Use of Oxygen Combustion Bombs⁵

E 178 Practice for Dealing with Outlying Observations⁶

3. Terminology

3.1 Definitions:

3.1.1 *adiabatic calorimeter*—a calorimeter which has a jacket temperature adjusted to follow the calorimeter temperature so as to maintain zero thermal head.

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

3.1.3 *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.

3.1.4 *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.

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

3.1.6 *isoperibol calorimeter*—a calorimeter which has a jacket of uniform and constant temperature.

3.1.7 *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.

3.2.2 *heat capacity*—the energy required to raise the temperature of the calorimeter one arbitrary unit.

3.2.2.1 *Discussion*—The heat capacity can also be referred to as the energy equivalent or water equivalent of the calorimeter.

4. Summary of Test Method

4.1 The heat capacity of the calorimeter is determined by burning a specified mass of benzoic acid in oxygen. A comparable amount of the analysis sample is burned under the same conditions in the calorimeter. The calorific value of the

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² Annual Book of ASTM Standards, Vol 05.06.

³ Annual Book of ASTM Standards, Vol 11.01.

⁴ Annual Book of ASTM Standards, Vol 14.03.

⁵ Annual Book of ASTM Standards, Vol 14.04.

⁶ Annual Book of ASTM Standards, Vol 14.02.