



Designation: E870 – 82 (Reapproved 2013)

Standard Test Methods for Analysis of Wood Fuels¹

This standard is issued under the fixed designation E870; 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 proximate and ultimate analysis of wood fuels and the determination of the gross caloric value of wood fuels sampled and prepared by prescribed test methods and analyzed according to ASTM established procedures. Test methods as herein described may be used to establish the rank of fuels, to show the ratio of combustible to incombustible constituents, to provide the basis for buying and selling, and to evaluate for beneficiation or for other purposes.

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.*

2. Referenced Documents

2.1 *ASTM Standards:*²

D1102 Test Method for Ash in Wood

E711 Test Method for Gross Calorific Value of Refuse-Derived Fuel by the Bomb Calorimeter (Withdrawn 2011)³

E775 Test Methods for Total Sulfur in the Analysis Sample of Refuse-Derived Fuel

E777 Test Method for Carbon and Hydrogen in the Analysis Sample of Refuse-Derived Fuel

E778 Test Methods for Nitrogen in the Analysis Sample of Refuse-Derived Fuel

E871 Test Method for Moisture Analysis of Particulate Wood Fuels

E872 Test Method for Volatile Matter in the Analysis of Particulate Wood Fuels

¹ These test methods are under the jurisdiction of ASTM Committee E48 on Bioenergy and Industrial Chemicals from Biomass and are the direct responsibility of Subcommittee E48.05 on Biomass Conversion.

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

3. Terminology

3.1 *proximate analysis*—an assay of the moisture, ash, volatile matter, and fixed carbon as determined by prescribed test methods. Other constituents such as sulfur and phosphorus are not included.

3.2 *ultimate analysis*—the determination of carbon and hydrogen in the material, as found in the gaseous products of its complete combustion, the determination of sulfur, nitrogen, and ash in the material as a whole, and the calculation of oxygen by difference.

4. Significance and Use

4.1 These test methods of analysis described herein can be used for the proximate analysis, ultimate analysis, and the determination of the gross caloric value of wood fuels.

5. Procedure

5.1 *Moisture*—Method E871.

5.2 *Ash*—Test Method D1102.

5.3 *Volatile Matter*—Test Method E872.

5.4 *Fixed Carbon*—The fixed carbon is a calculated value. It is the resultant of the summation of percentage moisture, ash, and volatile matter subtracted from 100. All percentages shall be on the same moisture reference base.

5.5 *Carbon and Hydrogen*—Test Method E777.

5.6 *Sulfur*—Test Methods E775.

5.7 *Nitrogen*—Test Methods E778.

5.8 *Oxygen*—The oxygen is a calculated value. It is the resultant of the summation of percentages carbon, hydrogen, sulfur, nitrogen, and ash subtracted from 100. All percentages shall be on the same moisture reference base.

5.9 *Gross Calorific Value*—Test Method E711.

6. Precision and Bias

6.1 The precision and bias of the test methods described herein are contained in these individual test methods.

7. Keywords

7.1 biomass; bulk density; densified particulate biomass; green tree chip; hogged fuel; particulate wood fuel; pellets; proximate; sawdust; ultimate; volatile matter