



Designation: E 1758 – 95^{€1}

Standard Test Method for Determination of Carbohydrates in Biomass by High Performance Liquid Chromatography¹

This standard is issued under the fixed designation E 1758; 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 (€) indicates an editorial change since the last revision or reapproval.

€¹ NOTE—Paragraphs 11.4 and 11.7 were updated editorially in October 1996.

INTRODUCTION

The carbohydrates making up a major portion of biomass samples are polysaccharides constructed primarily of glucose, xylose, arabinose, galactose, and mannose subunits. The polysaccharides present in a biomass sample can be hydrolyzed to their component sugar monomers by sulfuric acid in a two-stage hydrolysis process. These monosaccharides can then be quantitated by ion-moderated partition HPLC.

1. Scope

1.1 This test method covers the determination of carbohydrates present in a biomass sample, expressed as the percent, by mass, of each sugar on a 105°C dried mass basis.

1.2 Sample materials suitable for this procedure include hard and soft woods, herbaceous materials (such as switchgrass and sericea), agricultural residues (such as corn stover, wheat straw, and bagasse), wastepaper (such as office waste, box-board, and newsprint), acid or alkaline-pretreated biomass (washed free of any residual acid or alkali), and the solid fraction of fermentation residues. All results are reported relative to the 105°C oven-dried mass of the sample.

1.3 The options for the types of samples to be analyzed in this test method are as follows:

1.3.1 *As Received Samples:*

1.3.1.1 *Air Dried (%T_{ad})*—The percent, by mass, of total solids of the air-dried sample.

1.3.1.2 *45°C Dried (%T₄₅)*—The percent, by mass, of total solids of the 45°C dried sample.

1.3.1.3 *Freeze Dried (%T_{fd})*—The percent, by mass, of total solids of the freeze-dried sample.

1.3.2 *Extractives-Free Sample (%T_{ext})*—The percent, by mass, of total solids of the extracted sample determined at 105°C.

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

1.5 *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 applica-*

bility of regulatory limitations prior to use. Specific precautionary statements are given in Note 2 and Note 4.

2. Referenced Documents

2.1 *ASTM Standards:*

D 1193 Specification for Reagent Water²

E 1690 Test Method for the Determination of Ethanol Extractives in Biomass³

E 1721 Test Method for the Determination of Acid-Insoluble Residue in Biomass³

E 1756 Test Method for the Determination of Total Solids in Biomass³

E 1757 Practice for Preparation of Biomass for Compositional Analysis³

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 *as received biomass*—the biomass material as it is received in its field or process collected state.

3.1.2 *oven-dried mass*—the moisture-free mass of a biomass sample dried at 105°C as described in Test Method E 1756.

3.1.3 *prepared biomass*—material that has been treated according to Practice E 1757 in order to raise the total solids content above 85 %, by mass, based on an oven-dried solids mass.

3.2 *Abbreviations*—Abbreviations of standards used in the procedure, and definitions of terms used in the calculations are as follows:

3.2.1 *C₁*—known concentration of sugar recovery standard before hydrolysis, in mg/mL.

3.2.2 *C₂*—concentration of sugar recovery standard detected by HPLC after hydrolysis, in mg/mL.

¹ This test method is under the jurisdiction of ASTM Committee E-48 on Biotechnology and is the direct responsibility of Subcommittee E48.05 on Biomass Conversion.

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² *Annual Book of ASTM Standards*, Vol 11.01.

³ *Annual Book of ASTM Standards*, Vol 11.05.