Designation: D8442 – 22

Standard Test Method for Determination of Cannabinoids in Cannabis Raw Materials and Resin Cannabis Products by Gas Chromatography and Flame Ionization Detection[1]

This standard is issued under the fixed designation D8442; 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 cannabinoids in cannabis products by gas chromatography (GC) and flame ionization detection (FID).

1.2 This test method is applicable to cannabis raw materials and resin cannabis products as defined in Guide D8245, including those from hemp. Such material includes: biomass; plant material; flowers; resins; extracts; distillates; recovered solvents; and other intermediate processing material. The applicable concentration range of analysis will vary to some extent depending on the nature of the sample, for instance measurement of delta-9-tetrahydrocannabinol (Δ^9-THC) for regulatory purposes in hemp would require calibration to lower concentration levels compared to measurement of CBD in its isolate; however, in most cases, the test method is applicable to the determination of major and minor cannabinoids above about 0.1 mass% in concentration. Dilution of sample solutions is used to adjust concentrations to fall within appropriate calibration curves. Particular emphasis is placed on the determination of Δ^9-THC for regulatory compliance purposes and control. This test method can measure any cannabinoid that is eluted and detected from a GC column with sufficient resolution from any interfering compounds. Typical cannabinoids of interest that can be determined by this test method are shown in Table 1. Use of an HPLC technique is recommended if individual measurement of acids, such as THCA, is required.

1.3 The test method does not purport to identify all individual cannabinoids; however, individual users can adapt this test method for specific custom analyses to meet their needs.

1.4 *Units*—Values stated in SI units are to be regarded as the standard. No other units of measurement are included in this 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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.6 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

D4307 Practice for Preparation of Liquid Blends for Use as Analytical Standards

D4626 Practice for Calculation of Gas Chromatographic Response Factors

D8245 Guide for Disposal of Resin-Containing Cannabis Raw Materials and Downstream Products

D8270 Terminology Relating to Cannabis

D8282 Practice for Laboratory Test Method Validation and Method Development

D8334/D8334M Practice for Sampling of Cannabis/Hemp Post-Harvest Batches for Laboratory Analyses

D8375 Test Method for Determination of Cannabinoid Concentration in Dried Cannabis and Hemp Raw Materials using Liquid Chromatography Tandem Mass Spectrometry (LC-MS/MS)

E355 Practice for Gas Chromatography Terms and Relationships

E594 Practice for Testing Flame Ionization Detectors Used in Gas or Supercritical Fluid Chromatography

E1510 Practice for Installing Fused Silica Open Tubular Capillary Columns in Gas Chromatographs

3. Terminology

3.1 *Definitions:*

3.1.1 Refer to Terminology D8270 for guidance on terminology relating to cannabis.

[1] This test method is under the jurisdiction of ASTM Committee D37 on Cannabis and is the direct responsibility of Subcommittee D37.03 on Laboratory.

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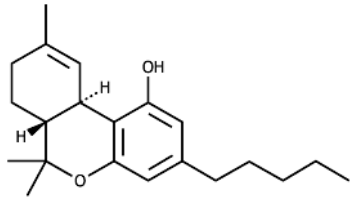
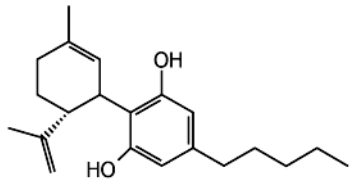
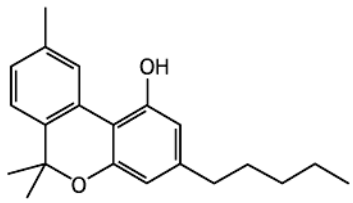
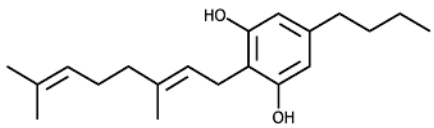
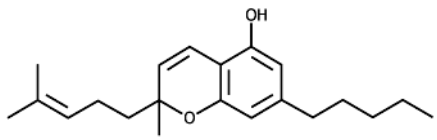
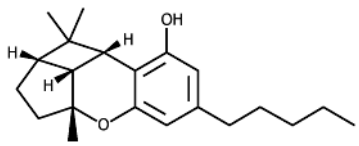
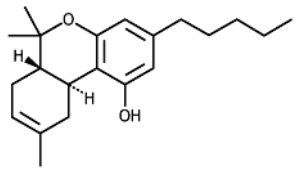
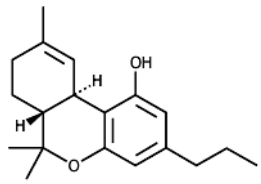
[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

TABLE 1 Typical Cannabinoids Measured

Name	CAS #	Abbreviation	Chemical Structure
Δ9-Tetrahydrocannabinol	1972-08-3	THC or d9-THC	
Cannabidiol	13956-29-1	CBD	
Cannabinol	521-35-7	CBN	
Cannabigerol	25654-31-3	CBG	
Cannabichromene	20675-51-8	CBC	
Cannabicyclol	21366-63-2	CBL	
Δ8-Tetrahydrocannabinol	5957-75-5	d8-THC	
Tetrahydrocannabivarin	31262-37-0	THCV	

3.1.2 *decarboxylation, n*—removal of a carboxylate group from a cannabinolic acid usually through application of heat or by exposure to ultraviolet light.

3.1.3 *distillate, n*—intermediate or final product resulting from separation by distillation often used in combination with terms to denote specific fractions.