



Designation: ~~D8197–21~~ **D8197 – 22**

## Standard Specification for Maintaining Acceptable Water Activity ( $a_w$ ) Range (0.55 to 0.65) for Dry Cannabis Flower Intended for Human/Animal Use<sup>1</sup>

This standard is issued under the fixed designation D8197; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

### INTRODUCTION

The concept of water activity is more than 50 years old. For many years, researchers tried to equate bacterial growth potential with water content. William Jones Scott showed in 1953 that microorganisms have a limiting  $a_w$  level for growth (1),<sup>2</sup> thus being the first to establish that bacterial growth correlated with water activity, not water content of organic materials. It is now generally accepted that  $a_w$  is more closely related to the microbial, chemical, and physical properties of foods and other natural products than is total moisture (2). It is firmly established that growth of specific microbes and metabolism of microbe associated toxins are inhibited at or below specific water activity values (3, 4).

Total water content (moisture) measurements do not necessarily reflect water available for microbial growth and thus are an inaccurate means for controlling microbial growth, because the water content sufficient for microbial growth is dependent on the substance being tested. Water activity measurement is more accurate than total water content measurement as it relates directly to the water available (in liquid form) to microbes and is constant relative to the particular microbe, regardless of the substance being tested.

[ASTM D8197-22](https://standards.iteh.ai/catalog/standards/sist/1382e0b6-23c5-4860-bbba-a289fa8adcde/astm-d8197-22)

### 1. Scope

1.1 This specification covers the recommended range of  $a_w$  suitable for safe and efficacious storage of cannabis flowers or portions thereof.

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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.3 *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:<sup>3</sup>

**D8196 Practice for Determination of Water Activity ( $a_w$ ) in Cannabis Flower**

<sup>1</sup> This specification is under the jurisdiction of ASTM Committee D37 on Cannabis and is the direct responsibility of Subcommittee D37.04 on Processing and Handling. Current edition approved Feb. 15, 2021/Oct. 1, 2022. Published March 2021/November 2022. Originally approved in 2018. Last previous edition approved in 2018/2021 as D8197 – 18-21. DOI: 10.1520/D8197-21.10.1520/D8197-22.

<sup>2</sup> The boldface numbers in parentheses refer to a list of references at the end of this standard.

<sup>3</sup> 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. Terminology

#### 3.1 Definitions of Terms Specific to This Standard:

3.1.1 *water activity*,  $a_w$ , *n*—the partial vapor pressure of water in a substance divided by the partial-vapor pressure of pure water at the same temperature which is calculated by dividing the partial vapor pressure of water in the substance ( $P$ ) by the partial-vapor pressure of pure water at the same temperature ( $P_o$ ), that is,  $a_w = P/(P_o)$ . This describes quantitatively the capability of the cannabis flower in a sealed container to affect the humidity of the container’s headspace air.

### 4. Significance and Use

4.1 This specification is designed for use on cannabis flower by cannabis producers, processors, dispensers, testing laboratories, and end users.

4.2 Analysis and control of water activity should be considered an important quality control step in ensuring a cannabis flower sample is being stored under optimal storage conditions to prevent mold or other microbiological growth and breakage.

4.3 All constituent testing, other than water activity in accordance with Practice **D8196**, shall be carried out on the cannabis flower sample that has been equilibrated to this specification in accordance with **6.1** and **6.2**.

4.4 Maintaining the requisite  $a_w$  throughout the supply chain from completion of drying through merchandising ensures safety and quality for the consumer.

4.5 Water activity ( $a_w$ ) is often used as a critical control point of Hazard Analysis and Critical Control Points (HACCP) programs. Controlling  $a_w$  should not be seen as a kill step.<sup>4</sup> Rather control of  $a_w$  focuses on preventing the growth and proliferation of microorganisms.

### 5. Testing

5.1 Refer to Practice **D8196**.

### 6. Chemical Composition—Specification for Storing Cannabis Flower

6.1  $a_w$  shall be less than 0.65 to ensure against undesirable growth of microorganisms such as mold.

6.2  $a_w$  shall be greater than 0.55 to ensure against physical damage (breakage) in routine handling and storage.

### 7. Special Considerations

7.1  $a_w$  values shall be between 0.55 and 0.65.

7.2 If  $a_w$  is greater than 0.65, further drying of the cannabis flower(s) shall be required to ensure the  $a_w$  is 0.55 to 0.65.

7.3 If  $a_w$  is less than 0.55, moisture should be added to bring the cannabis flower into the desired range. Add moisture by a suitable means such as humidity control of storage facility or placing the flower(s) in a hermetically sealed container with a humidity control device appropriate to the container and contents to effectively bring the stored cannabis flower(s) into the specified 0.55 to 0.65  $a_w$  range. (Do not spray liquid water directly upon the flower as this may induce damp spots sufficient to promote localized mold growth.)

7.4 If the  $a_w$  of the cannabis flower is between 0.55 and 0.65, the cannabis flower should be stored in a humidity controlled environment such as a humidity controlled room, or in hermetically sealed containers with a humidity control device appropriate to the container and contents to ensure/maintain product safety and quality.

<sup>4</sup> *Kill step* is the term typically used to describe a point in the food manufacturing process where potentially deadly pathogens are eradicated from the product (usually by killing the pathogen). Traditionally the “kill step” has involved cooking, pasteurization, pathogen-killing washes, irradiation, etc. **(5)**.