



Designation: E1396 – 90 (Reapproved 2004)

Standard Test Method for Sensory Evaluation of Oleoresin Capsicum¹

This standard is issued under the fixed designation E1396; 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 describes standardized procedures for the sensory evaluation of heat in oleoresin capsicums ranging from 100 000 to 1 000 000 Scoville heat units (S.H.U.).

1.2 This test method is intended as an alternative to the Scoville heat test, but results can be expressed in Scoville heat units (see [ASTA Method 21.0](#) and ISO 3513).

1.3 This test method does not apply for ground red pepper, low heat chili peppers, or chili powder.

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 applicability of regulatory limitations prior to use.* Specific precautionary statements are given in Section 8.

2. Referenced Documents

2.1 *ASTM Standards*:²

[E1083 Test Method for Sensory Evaluation of Red Pepper Heat](#)

2.2 *ASTA Standard*:

[ASTA Method 21.0 Official Analytical Methods](#)³

2.3 *ISO Standard*:

[ISO 3513-1977 \(E\), Spices and Condiments-Chilies-Determination of Scoville Index](#)⁴

¹ This test method is under the jurisdiction of ASTM Committee E18 on Sensory Evaluation of Materials and Products and is the direct responsibility of Subcommittee E18.06 on Food and Beverage Evaluation.

Current edition approved Oct. 1, 2004. Published October 2004. Originally approved in 1990. Last previous edition approved in 1997 as E1396 – 90 (1997)^{e2}. DOI: 10.1520/E1396-90R04.

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 Available from American Spice Trade Association, Box 1267, Englewood Cliffs, NJ 07632.

⁴ Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036.

2.4 *AOAC Method*:

Official Methods of Association of Official Analytical Chemists International (1996) 995.03 (43.1.43)

3. Terminology

3.1 *Definitions of Terms Specific to This Standard*:

3.1.1 *approaching strong heat*—*N*-vanillyl-*n*-nonamide, 1.30 ppm. This is 13.0 cm on the 15-cm line scale. It is unusual to see an oleoresin stronger than this. But in the event that a pepper with more than expected heat is tested, there remains the last 2 cm on the 15-cm line scale.

3.1.2 *moderate heat*—*N*-vanillyl-*n*-nonamide, 0.80 ppm. This is a “moderate” amount of pepper heat. It reads 10 cm on the 15-cm line scale.

3.1.3 *rinse*—to purge the oral cavity with unsalted soda crackers and 20°C spring or distilled water by slowly chewing and swallowing the cracker, followed by swirling the water around in the mouth and swallowing. This procedure is repeated as often as is natural and comfortable for the panelist.

3.1.4 *Scoville heat units (S.H.U.)*—the commonly accepted unit for expressing heat levels in capsicum products (see Test Method [E1083](#) and [ASTA Method 21.0](#)). Scoville heat units range from 0 to 1 500 000.

3.1.5 *slight heat*—*N*-vanillyl-*n*-nonamide, 0.40 ppm. This is a “slight” amount of pepper heat. It reads 5 cm on the 15-cm line scale.

3.1.6 *strong heat*—best defined by concept. Hotter than the 1.30-ppm *N*-vanillyl-*n*-nonamide sample. It reads 15 cm on the 15-cm line scale.

3.1.7 *threshold heat*—best defined by concept rather than by a standard dilution of *N*-vanillyl-*n*-nonamide. Threshold is that point where a panelist just barely senses burn/heat. It reads 1.25 cm on the 15-cm line scale.

3.1.8 *zero heat*—*N*-vanillyl-*n*-nonamide, 0 ppm. No sensory heat. It reads 0 cm on the line scale.

4. Summary of Test Method

4.1 Oleoresin capsicum is steeped in hot water with polysorbate-80 or polysorbate-60 for 3 min, filtered, and the filtrate diluted in room temperature water. Trained panelists

compare the heat in the pepper extract to a known concentration of a standard solution of synthetic capsaicin (*N*-vanillyl-*n*-nonamide) using a 15-cm line scale. The tasting procedure is timed and takes 2 min for one test sample and 9 min for two test samples.⁵ This test method is a minor variation on the ground red pepper sensory method.

4.2 Panelists are screened for their accuracy and precision and trained to use the 15-cm line scale during two to three 15-min training sessions.

4.3 Standard general requirements for sensory testing follows.⁴

5. Significance and Use

5.1 This test method provides quick and accurate ratings for the sensory heat in oleoresin capsicums ranging from 100 000 to 1 000 000 Scoville heat units.

5.2 Sensory results from this test method correlate highly ($r^2 = 0.94$) with results from high pressure liquid chromatography; making the two methods substitutable.⁶

6. Apparatus

6.1 *Magnetic Hot Plate Stirrers*, two.

6.2 *Beakers*, 600-mL, four.

6.3 *Small Beaker*, 50 to 100 mL.

6.4 *Analytical Balance*, capacity greater than 300 g, sensitive to 0.01 g.

6.5 *Volumetric Flasks*, 1000-mL stoppered, two.

6.6 *Stopwatch*.

7. Reagents and Materials

7.1 *Coffee Filter Papers*, or low flavor qualitative filter paper.

7.2 *Medicine Cups*.

7.3 *Unsalted Soda Crackers*, unsalted tops.

7.4 *Water*, bottled, distilled, or deionized when available, or still spring water.

7.5 *Polysorbate-80 or Polysorbate-60*, food grade.

7.6 *Rating Forms*, 15-cm line scale anchored at 0 (none), 1.25 cm (threshold), 5 cm (slight), 10 cm (moderate), 15 cm (strong); see [Appendix X1](#).

7.7 *N*-vanillyl-*n*-nonamide, available from Penta International (some restrictions apply).

8. Precautions

8.1 Pure *N*-vanillyl-*n*-nonamide will burn the eyes and skin upon direct contact. Gloves and caution must be used when handling *N*-vanillyl-*n*-nonamide in the crystalline form.

9. Calibration and Standardization of Panelists

9.1 Select ten to twelve panelists based on availability, attitude, and motivation of panelists. Screening for taste sensitivity is not necessary.

9.2 Prepare stock solution of *N*-vanillyl-*n*-nonamide (see [10.1.2](#)).

9.3 Dilute the stock solution of *N*-vanillyl-*n*-nonamide to the following concentrations:

9.3.1 *N*-vanillyl-*n*-nonamide, 0 ppm—Add none of the stock solution to 200 mL of water.

9.3.2 *N*-vanillyl-*n*-nonamide, 0.40 ppm—Dilute 13.4 g of stock solution to 200 mL with water.

9.3.3 *N*-vanillyl-*n*-nonamide, 0.80 ppm—Dilute 26.8 g of the stock solution to 200 mL with water.

9.3.4 *N*-vanillyl-*n*-nonamide, 1.30 ppm—Dilute 43.3 g of the stock solution to 200 mL with water.

9.4 *Session 1 (15 min)*—Brief the panelists on the purpose of this test method. The purpose of the first session is to standardize their tongues and mouth to the reference standards with respect to the 15-cm line scale on the ballot (see [Fig. 1](#)). Explain to the panelists that they may use any of the infinite number of points on the line scale to describe how hot a given sample is. Panelists will taste (see [10.2.3.1-10.2.3.3](#)) the coded standard dilutions prepared, evaluate them critically, concentrating and memorizing their individual sensory heat levels. Panelists rinse well between samples with unsalted soda crackers and spring or distilled water for 2 min (they are timed). After the standards have been tasted, the correct rating for each reference standard is given. A new set of labeled standard dilutions is presented to the panelists to review. Definitions for “0,” “threshold,” “slight,” “moderate,” “approaching strong,” and “strong” are provided. Refer to [3.1.1, 3.1.2, 3.1.6, 3.1.7, and 3.1.8](#).

9.5 *Session 2 (15 min)*—This session should follow the first training session by one to two days. During this session, the panelists will be both trained and tested. Explain to the panelists how they will be evaluating the actual red pepper test samples. Explain the entire tasting procedure as follows:

9.5.1 Panelists are served 10-mL portions of each of two samples in coded medicine cups. The control (0.4-ppm *N*-vanillyl-*n*-nonamide) is always served first, coded “C.” The test sample is served second, with a random two-letter code. Two sets of samples are evaluated per sitting. The tasting procedure is described in [10.2.3](#).

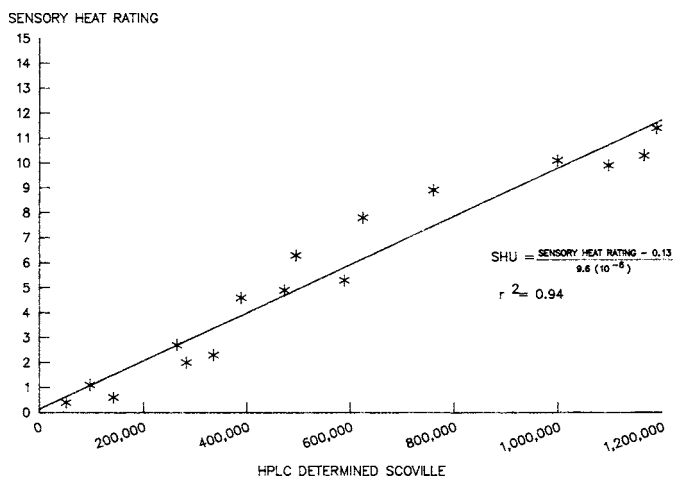


FIG. 1 Oleoresin Capsicum Heat Sensory versus HPLC

⁵ Gillette, M. H., Appel, C. E., and Lego, M., “A New Method for the Sensory Evaluation of Red Pepper Heat,” *Journal of Food and Science*, Vol 49, No. 4, 1984, p. 1028.

⁶ Hoffman, P. G., Salb, M. C., and Galetto, W. G., “Separation and Quantitation of Red Pepper Heat Principles by Reverse Phase HPLC,” *Journal of Agricultural and Food Chemistry*, Vol 31, No. 6, Oct. 1983, p. 1326.