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Standard Guide for Odor Evaluation of Products and Materials Under Controlled Conditions With Trained Panel[1]

This standard is issued under the fixed designation E3261; 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 guide provides guidelines for odor evaluation of products and materials under controlled conditions with a trained panel.

1.2 This guide addresses odor, aroma, malodor and fragrance (see Terminology E253).

1.3 This guide addresses assessor selection and training, sample preparation, and test procedures specific to odor evaluations.

1.4 This guide does not address odor of any specific category of products.

1.5 This guide does not recommend a specific testing method. The user is responsible for identifying the most appropriate test design and analysis tools to address the research questions.

1.6 *Units*—The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.7 *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.*

1.8 *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]

E253 Terminology Relating to Sensory Evaluation of Materials and Products

E544 Practice for Referencing Suprathreshold Odor Intensity

E619 Practice for Evaluating Foreign Odors and/or Flavors from Paper Packaging

E1593 Guide for Assessing the Efficacy of Consumer Products in Reducing the Perception of Malodor

E1885 Test Method for Sensory Analysis—Triangle Test

E2139 Test Method for Same-Different Test

E2164 Test Method for Directional Difference Test

E3000 Guide for Measuring and Tracking Performance of Assessors on a Descriptive Sensory Panel

E3009 Test Method for Sensory Analysis—Tetrad Test

E3041 Guide for Selecting and Using Scales for Sensory Evaluation

3. Terminology

3.1 See Terminology E253 for sensory evaluation terminology.

4. Summary of Guide

4.1 Odor testing has many unique requirements for sensory assessment. This guide outlines proper assessor selection, training, protocols for odor testing including sample collection and preparation, and presentation methods spanning assessments from small jars to large chambers as well as olfactometer equipment and direct sniffing. Project goals and objectives will dictate the evaluation method or methods. A complete report will outline choices made in the final project protocol.

[1] This guide is under the jurisdiction of ASTM Committee E18 on Sensory Evaluation and is the direct responsibility of Subcommittee E18.07 on Personal Care and Household Evaluation.

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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.

5. Significance and Use

5.1 This guide provides general guidelines and recommendations for presenting product and material samples to assessors for evaluation of odor attributes under controlled conditions. Specific situations may require variations to these guidelines.

5.2 This guide is designed for use in assessing odor of products and materials for such applications as, but not limited to, development, reformulation, complaint investigation, quality control, and stability/shelf-life.

5.3 Elements of this guide may also be utilized for assessor training programs involving odor evaluation tasks.

6. Facility Considerations

6.1 The testing environment must be free of noise, non-test odors, and other distractions.

6.2 All staff and assessors must be odor-free with considerations for wearing only odor-free, especially fragrance-free, personal care products.

6.3 *Ventilation:*

6.3.1 Ventilation may require a higher air exchange rate than a typical laboratory space.

6.3.2 In sample preparation spaces and evaluation rooms, local exhaust ventilation (LEV) can be used to immediately remove odors near the point of generation. It is best to remove odors from as close to the point of generation as possible.

6.3.3 When odors are generated more broadly, a larger space may require exhaust with a wider capture area.

6.3.4 Purge ventilation may be periodically necessary for short-term, high exhaust from laboratory spaces to remove odors generated during activities such as sample preparation.

6.3.5 Exhaust ventilation typically is vented out of the building space. Ensure the exhaust is not adjacent to any building air intakes. If exhaust requirements are excessive, it may be necessary to utilize filtration systems (for example, carbon) to clean and then return air to the laboratory space.

6.3.6 Pressure differentials between areas of the laboratory should be considered. Odor-free areas tend to be designed at positive pressure to keep odors out. Odorous areas tend to be designed at negative pressure to keep odors contained.

6.4 Work surfaces throughout the laboratory space should be selected for properties of low emissions and odor absorption as well as the ability to be easily and effectively cleaned.

6.5 Lighting and other laboratory features should also be considered. Review ASTM MNL60-2ND (**1**)[3] for detailed facility design guidance.

7. Assessor Selection and Training

7.1 *Assessor Selection:*

7.1.1 The assessor selection process should include the principles embodied in ASTM STP758 (**2**).

7.1.2 Assessors may be recruited from within the company or from the local community.

7.1.3 Internal employees allow for assessors to be on site and for control of proprietary information. However, this may cause resource and schedule conflicts since evaluations may not be the employees' primary job function.

7.1.4 Care must be taken to ensure that employees with technical knowledge of a project are excluded from evaluations to avoid significant biases.

7.1.5 Assessors must also be willing to observe rules such as not eating or chewing gum before a panel.

7.2 *Recruitment and Screening:*

7.2.1 Initial screening of assessors should determine availability and interest.

7.2.2 Potential assessors should not have any health-related problems that may interfere with their sense of smell, for example, severe allergies, migraines, sinus issues, etc. They must not have frequent aversions to odors or commonly experience adverse symptoms from odors (for example, headache, nausea, etc.). They should be checked for anosmia or hyperosmia to project related odors. Additionally, assessors with overall low sensitivity to odors or specific anosmia relevant to the study should be eliminated from consideration for the testing.

7.2.3 Potential assessors should be tested for their ability to identify and discriminate odors, either generally or specific to the test samples. Some screening examples include odor identification tests, odor threshold tests for standard odorants, and difference tests for similar or related odors, or both. Assessors might only be utilized for specific types of evaluation tests, so screening methods chosen should correspond to the evaluation methods for the sensory study. Various screening tests are commercially available, or samples can be prepared in-house (**3**, **4**, **5**).

7.2.4 Screening also may be conducted to test ability to complete basic ranking or rating activities. For example, ranking three samples of a standard odorant (for example, butanol, isovaleric acid, phenyl ethyl alcohol) at multiple concentrations in air or liquid solution. Screening methods should also be chosen that most directly match with project objectives.

7.2.5 A written program for assessor screening should be developed including clear criteria for acceptance and rejection of potential assessors for the training phase.

7.3 *Assessor Training:*

7.3.1 Training procedures will depend on the project objectives. The level of training should match the level of the evaluation task to be completed. For example, descriptive analysis training on multiple attributes will require significantly more training than ratings of overall odor intensity.

7.3.2 Specific training procedures will depend on the chosen odor attribute(s) and the qualitative or quantitative method(s).

7.3.3 Assessor training should be conducted by individuals having direct experience with appropriate sensory evaluation training and testing techniques.

7.3.4 A written training program should be developed including clear criteria for acceptance and rejection of the assessors as they progress through training.

7.3.5 The first step in training should be to orient assessors to general concepts of odor assessments and sensory evaluation

[3] The boldface numbers in parentheses refer to the list of references at the end of this standard.