



Standard Practices for Referencing Suprathreshold Odor Intensity¹

This standard is issued under the fixed designation E 544; 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 These practices are designed to outline a preferred means for referencing the odor intensities of a material in the suprathreshold region.

1.2 The general objective is to reference the odor intensity rather than other odor properties of a sample.

1.3 These practices are designed to reference the odor intensity on the ASTM Odor Intensity Referencing Scale of any odorous material. This is done by a comparison of the odor intensity of the sample to the odor intensities of a series of concentrations of the reference odorant, which is 1-butanol (*n*-butanol).

1.4 The method by which the reference odorant vapors are to be presented for evaluation by the panelists is specified. The manner by which the test sample is presented will depend on the nature of the sample, and is not defined herein.

1.5 Test sample presentation should be consistent with good standard practice (1)² and should be explicitly documented in the test report.

1.6 *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. See Annex A1 for specific safety data.*

2. Referenced Documents

2.1 *ASTM Standards:*

D 1292 Test Method for Odor in Water³

3. Terminology

3.1 *ASTM odor intensity referencing scale*—a series of 1-butanol dilutions used to establish which concentration exhibits an odor intensity matching that of the sample.

3.2 *concentration*—a series of concentrations of 1-butanol in odorless air, nitrogen, or the water diluent, made to specific reference dilutions which serve as the reference scale, volume basis, of 1-butanol diluted air or in water. In the latter case, the

temperature of the solution during the test should be reported.

3.3 *dynamic scale*—the reference scale in which vapor dilutions are prepared by continuous mixing of vapors of 1-butanol with an odorless gas, such as air, to yield constant dilutions of vapor in the gas.

3.4 *panelists*—the individuals who compare the odor intensity of the sample to the reference scale. These individuals should be able to do this with a consistency described in 5.5.

3.5 *perceived (sensory) odor intensity*—the intensity of an odor sensation which is independent of the knowledge of the odorant concentration.

3.6 *sample*—a material in any form exhibiting an odor that needs to be measured.

3.7 *static scale*—the reference scale in which dilutions of 1-butanol in water are prepared in flasks and presented for odor intensity comparison from the flasks.

3.8 *suprathreshold odor intensity*—perceived (sensory) intensity of the odor in that intensity region in which the odor is clearly experienced.

4. Summary of Practice

4.1 The reference odorant used to generate an odor intensity scale is 1-butanol (*n*-butanol). The reasons for its selection are summarized in Appendix X1. A geometric progression scale with a ratio of 2 is recommended, that is, a scale in which each reference dilution differs in its 1-butanol concentration from the preceding dilution by a factor of 2.

4.2 Two procedures, A and B, are described in these recommended practices. They differ in the method by which the diluted 1-butanol vapors are prepared.

NOTE 1—The relationships between the odor intensity of 1-butanol concentrations in air and in water have not been evaluated. Translation of Procedure B data to the numerical values of Procedure A is not possible at this time.

4.2.1 In Procedure A, hereafter referred to as the dynamic scale method, a dynamic-dilution apparatus is used. This is equipped with a series of sniffing ports from which constant concentrations of 1-butanol emerge at constant volumetric flow rates in air.

4.2.2 In Procedure B, hereafter referred to as the static-scale method, a series of Erlenmeyer flasks containing known concentrations of 1-butanol in water is used.

4.3 The odor of the sample is matched, ignoring differences in odor quality, against the odor intensity reference scale of 1-butanol by a panel yielding at least eight independent

¹ These practices are under the jurisdiction of ASTM Committee E-18 on Sensory Evaluation of Materials and Products and are the direct responsibility of Subcommittee E18.04 on Fundamentals of Sensory.

Current edition approved April 10, 1999. Published July 1999. Originally published as E 544 – 75. Last previous edition E 544 – 75(1997).

² The boldface numbers in parentheses refer to the list of references at the end of these recommended practices.

³ *Annual Book of ASTM Standards*, Vol 11.01.