



Designation: D1292 – 15 (Reapproved 2021)^{ε1}

Standard Test Method for Odor in Water¹

This standard is issued under the fixed designation D1292; 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.

^{ε1} NOTE—The WTO caveat was added editorially in December 2021.

1. Scope

1.1 This test method² covers the determination of the odor (that is, the property that affects the sense of smell) of water. A suggested system for classifying odors is given as [Annex A1](#). The test method is applicable to the determination of odor intensity in terms of odor intensity index or threshold odor number.

1.2 Effluents may carry a myriad of compounds, difficult to measure individually, which contribute to odor problems. Combinations of compounds can cause an odor intensity or develop a characteristic that cannot be anticipated from odors of the individual substances.

1.3 Because of the variation in human sensitivity, high precision in determining odor intensity is not possible. There will not always be agreement on odor characteristics by various testers. Odor analysis provides the tool to measure variation in odor intensity at a given sampling point. The degree of variation may indicate the magnitude or importance of an odor problem. Determining the cause of the variation or the source of the objectionable characteristic may define the odor problem better than analysis for individual compounds.

1.4 The values stated in SI or inch-pound units are to be regarded as the standard. The values given in parentheses are for information only.

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.* For specific hazard statements, see the warning statement under [10.1](#).

1.6 *This international standard was developed in accordance with internationally recognized principles on standard-*

ization 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:³

[D1066 Practice for Sampling Steam](#)

[D1129 Terminology Relating to Water](#)

[D1193 Specification for Reagent Water](#)

[D2777 Practice for Determination of Precision and Bias of Applicable Test Methods of Committee D19 on Water](#)

[D3370 Practices for Sampling Water from Flowing Process Streams](#)

3. Terminology

3.1 Definitions:

3.1.1 The terms *odor-intensity index* and *odor threshold number* in this standard are defined in accordance with Terminology [D1129](#) as follows:

3.1.2 *odor-intensity index, n*—the number of times the concentration of the original sample is halved by addition of odor-free water to obtain the least definitely perceptible odor.

3.1.3 *odor threshold number, n*—the greatest dilution of the sample with odor-free water to yield the least definitely perceptible odor.

3.2 For definitions of other terms used in this test method, refer to Terminology [D1129](#).

4. Summary of Test Method

4.1 A sample of water is diluted with odor-free water until a dilution is obtained that has the least definitely perceptible odor. The test is made by two or more testers. One makes dilutions and the others determine odor intensity. Samples are tested in generally increasing concentration of odorant, although not in consecutive sequence of dilutions, until the odor is perceived. The persons making the test select the odorous

¹ This test method is under the jurisdiction of ASTM Committee [D19](#) on Water and is the direct responsibility of Subcommittee [D19.05](#) on Inorganic Constituents in Water.

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² This test method is based on a procedure proposed by the Dow Chemical Co. in a private communication.

³ 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.

sample from among three flasks, two of which contain odor-free water. Odor is measured without regard to the presence of suspended matter or immiscible substances in the sample. Cognizance is taken of the fact that there is no absolute odor value and that the test is to be used for comparison only. The test is carried out at 40°C.

5. Significance and Use

5.1 The odor of water is a subjective property which is recognized as having a significant effect on its quality. This test is intended to provide a reproducible test method for determining the intensity of odor in waters for comparative or control purposes.

5.2 The test may be useful in checking the quality of raw or treated waters, determining the effectiveness of treatment procedures, or in tracing sources of contamination or leaks in industrial processes.

5.3 The results of the test are very dependent upon the observers, since the sensitivity of individuals to odor is highly variable and changes from day to day. Careful standardization of the conditions is essential.

6. Interferences and Precautions

6.1 The area used for the test shall be free of interfering odors.⁴ An ideal laboratory has a separate room equipped with activated-carbon filtered inlet air of controlled, constant temperature and humidity. A relative humidity of 50 % is recommended wherever control is feasible. Cleanliness is an absolute necessity. All equipment used in the test shall be clean and free of odor and shall be restricted to use for odor determination. An odorless detergent shall be used to cleanse the hands and faces of the persons participating in the test from tobacco, shaving preparation, cosmetic, and other odors. Testers shall not smoke, chew tobacco or gum, or eat food of pronounced taste or odor for at least 30 min prior to the determination.

6.2 The physical condition of the participants is important. The odor tester shall be free from any conditions affecting the olfactory system. Prolonged use of the sense of smell causes olfactory fatigue. Repeated smelling of the same odor has the same effect. Therefore, for prolonged testing, frequent rest periods, preferably in fresh, odor-free air, are necessary for recuperation. Under ordinary circumstances no operator shall carry out odor tests for longer than 15 min without rest in order to avoid olfactory fatigue. This is an average time. Stronger odorants may dull olfactory response within a few minutes while waters of good quality may be tested over longer time intervals. If personnel are limited, the testers may check their observations after allowing sufficient time to relax the olfactory system.

6.3 Not all persons are capable of carrying out this test. The testers should be thoroughly screened to obtain the best possible precision, especially for research purposes. However, if due care is exercised, most persons qualify for routine work. At least two testers are necessary, but more are preferred: one

to make the preliminary screening and prepare the dilutions and the other or others to make the actual odor determination. The testers making the determination shall not know the dilutions; in no case shall they make the dilutions. Dilutions shall be tested by presenting samples ranging from lower to higher concentrations but they must not be presented in sequence. Insertion of a set of blanks or lower concentrations into the series is recommended. This lessens the chance of memorizing odors or guessing.

6.4 Color is often imparted by various contaminants in wastewater. This color is often evident below perceptible odor levels. A colored lighting system may be used to eliminate color bias in selection of the odor-containing flask by the testers. Photographic safelights with interchangeable filters are useful for this purpose.

6.5 Turbidity in some wastewaters may be evident below perceptible odor levels. The colored lighting system described in 6.4 may not eliminate this bias. In such instances, external masking of the flasks may be necessary. Painting the flasks to make them opaque is a means of masking turbidity.

6.6 For maximum control, the odor laboratory⁵ should be divided into two areas separating the sample preparation and the odor detection activities. This allows isolation of the dilution operator from the odor tester and permits greater control of background odor in the odor measuring area.

7. Apparatus

7.1 *Constant-Temperature Bath*, capable of maintaining a temperature of 40 ± 1°C.

7.2 *Sample Bottles, Glass-Stoppered*—Biochemical oxygen demand (BOD) bottles are satisfactory for this purpose.

7.3 *Flasks*, 500 mL, wide-mouth Erlenmeyer, glass-stoppered or covered by watch glasses.

8. Reagents

8.1 *Activated Carbon*, water purification grade. Carbon should be renewed after treating approximately 20 L of water, or more often as necessary.

8.2 *Water, Odor-Free*—Prepare odor-free water by passing reagent water conforming to Specification **D1193**, Type I or II, through a glass column 0.9 m (3 ft) long and 51 mm (2 in.) in diameter, packed with granular activated carbon, at a flow rate of less than 11 L/h. The water used to prepare odor-free dilution water shall have a total dissolved solids content not exceeding that of the sample being tested. Use glass connections and tubing in making the system. The column ends may be packed with glass wool to support the carbon. Test the column effluent at 40°C. This is necessary since the quantities and nature of impurities in the water will affect useful carbon life. It has been found that columns used infrequently may develop a biological growth which imparts odor. To check the condition of the column after an idle period (such as a weekend) a simple test is recommended. Fill a short glass tube

⁴ Baker, R. A., "Critical Evaluation of Olfactory Measurement," *Journal of the Water Pollution Control Federation*, Vol 34, No. 6, June 1962, pp. 582–591.

⁵ Baker, R. A., "Odor Testing Laboratory," *Journal of the Water Pollution Control Federation*, Vol 35, No. 11, November 1963, pp. 1396–1402.