



Standard Test Method for Biodegradability of Alkylbenzene Sulfonates¹

This standard is issued under the fixed designation D 2667; 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 method² covers the determination of the degree of biodegradability of alkylbenzene sulfonates. It serves as an index of the suitability of the sulfonate for general use as a surfactant.

1.2 In general, this test method distinguishes between sulfonates in which the alkyl side chains are linear and those in which they are branched, since the former are more readily biodegradable. If the alkylbenzene sulfonate in fully formulated products is to be examined, it must be extracted using the method noted in Annex A1. (See Appendix X1 for data.)

1.3 *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.* Material Safety Data Sheets are available for reagents and materials. Review them for hazards prior to usage.

2. Referenced Documents

2.1 ASTM Standards:

D 1293 Test Methods for pH of Water³

D 2330 Test Method for Methylene Blue Active Substances⁴

E 1625 Test Method for Determining Biodegradability of Organic Chemicals in Semi-Continuous Activated Sludge (SCAS)⁵

3. Summary of Test Method

3.1 The sample is first subjected to a presumptive test based on shake culture. When necessary, the sample may be subjected to a confirming test based on semicontinuous treatment with activated sludge.

3.2 In the presumptive test, microorganisms are inoculated into a flask that contains a chemically defined microbial growth medium (basal medium) and the surfactant to be tested. Aeration is accomplished by continuous shaking of the flask. Following two adaptive transfers, biodegradation is determined by measuring the reduction in surfactant content during the test period.

3.3 In the confirming test, activated sludge obtained from a sewage treatment plant is used. The sludge, the surfactant to be tested, and a synthetic sewage used as an energy source for the sludge microorganisms are all placed in a specially designed aeration chamber. The mixture is aerated for 23 h, allowed to settle, and the supernatant material removed. The sludge remaining in the aeration chamber is then brought back to volume with fresh surfactant and synthetic sewage and the cycle repeated. Biodegradation is determined by the reduction in surfactant content during each cycle.

4. Significance and Use

4.1 This test method is designed to determine whether the sulfonate tested will be removed sufficiently by usual methods of sewage treatment for the effluent to be safely discharged to the environment without further treatment.

4.2 If the surfactant reduction in the presumptive test equals or exceeds 90 %, the material is considered to be adequately biodegradable without further testing.

4.3 If the surfactant reduction in the presumptive test is between 80 and 90 %, the material should be subjected to the confirming test.

4.4 If the surfactant reduction in the presumptive test is below 80 %, the material is considered inadequately biodegradable.

4.5 If it is necessary to run the confirming test, the surfactant reduction in this test must be at least 90 % for the material to be considered adequately biodegradable.

¹ This test method is under the jurisdiction of ASTM Committee E-47 on Biological Effects and Environmental Fate and is the direct responsibility of Subcommittee E47.04 on Environmental Fate of Chemical Substances.

Current edition approved Oct 10, 1995. Published December 1995. Originally published as D 2667 – 67 T. Last previous edition D 2667 – 89.

² This test method is based on "A Procedure and Standards for the Determination of the Biodegradability of Alkyl Benzene Sulfonate and Linear Alkylate Sulfonate" by the Committee on Biodegradation Test Methods of the Soap and the Detergent Association, *Journal of the Americal Oil Chemists' Society*, Vol 42, 1965, p. 986.

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

⁴ *Annual Book of ASTM Standards*, Vol 11.02.

⁵ *Annual Book of ASTM Standards*, Vol 11.05.