



Standard Test Method for Determination of Various Anionic Surfactant Actives by Potentiometric Titration¹

This standard is issued under the fixed designation D 6173; 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 is based on a potentiometric titration of common anionic surfactants and blends of anionic surfactant with a hydrotrope. This test method solely is intended for the analysis of active matter in the following surfactants: alcohol ether sulfate, alpha olefin sulfonate, alkylbenzene sulfonic acid, alcohol sulfate, sodium alkylbenzene sulfonate/sodium xylene sulfonate blend (5:1), sodium alkylbenzene sulfonate/sodium xylene sulfonate blend (16:1), and sodium alkylbenzene sulfonate/sodium xylene sulfonate blend (22:1). It has not been tested for surfactant formulations.

1.2 *This standard does not purport to address all 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 459 Terminology Relating to Soaps and Other Detergents²

D 1193 Specification for Reagent Water³

D 1681 Test Method for Synthetic Anionic Active Ingredient in Detergents by Cationic Titration Procedure²

D 3049 Test Method for Synthetic Anionic Ingredient by Cationic Titration²

E 180 Practice for Determining the Precision of ASTM Methods for Analysis and Testing of Industrial Chemicals⁴

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

3.1.1 *active matter, n*—the organic surface-active material present in the detergent. Also defined in Terminology D 459 as active ingredient of detergents.

4. Summary of Test Method

4.1 This test method describes a potentiometric titration procedure for determining active matter in anionic surfactant. The anionic surfactant is first dissolved in water, and the pH of the solution is adjusted according to the type of anionic surfactant being measured. In the potentiometric titration the anionic surfactant is titrated with a standard solution of Hyamine using a surfactant electrode, and the reaction involves the formation of a complex between the anionic surfactant and the cationic titrant (Hyamine), which then precipitates. At the end point the surfactant electrode appears to respond to an excess of titrant with potential change large enough to give a well defined inflection in the titration curve.

5. Significance and Use

5.1 The most common anionic surfactants presented in this test method are used widely in synthetic detergents and other household cleaners. Current analysis of the active matter in these anionic surfactants involves the two-phase aqueous/chloroform titration with a mixed indicator, organic dyes such as disulphine blue/dimidium bromide (see Test Method D 3049), and methylene blue (see Test Method D 1681). This test method eliminates the use of hazardous chloroform, the use of which is restricted for environmental and toxicological reasons.

5.2 This test method also describes the titration of various ratio blends of sodium alkylbenzene sulfonate and sodium xylene sulfonate. Active matter content in these blends is attributable directly to sodium alkylbenzene sulfonate. Therefore, the presence of various amounts of sodium xylene sulfonate in these blends does not interfere with the determination of percent actives.

6. Apparatus

6.1 *Autotitration System*, equipped with a delivery buret system, 10 or 20-mL capacity.^{5,6}

6.2 *Phoenix Surfactant Combination Electrode*^{5,6}, nitrate

¹ This test method is under the jurisdiction of ASTM Committee D-12 on Soaps and Other Detergents and is the direct responsibility of Subcommittee D12.12 on Analysis of Soaps and Synthetic Detergents.

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² *Annual Book of ASTM Standards*, Vol 15.04.

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

⁴ *Annual Book of ASTM Standards*, Vol 15.05.

⁵ The sole source of supply of the autotitration system and Phoenix electrode known to the committee at this time is Brinkmann Instruments, Inc. Cantiague Rd., Westbury, NY 11590.

⁶ If you are aware of alternative suppliers, please provide this information to ASTM headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee, which you may attend.