



Standard Test Method for Synthetic Quaternary Ammonium Salts in Fabric Softeners by Potentiometric Titrations¹

This standard is issued under the fixed designation D5070; 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 describes a potentiometric titration procedure for the determination of quaternary ammonium salts in fabric softeners. This test method is intended for the analysis of known quaternary ammonium salts such as the dialkyl dimethyl quaternary ammonium compound type and the di-amidoamine based quaternary ammonium compound type.

1.2 The quaternary ammonium salts conform to the structures shown in [Fig. 1](#) and [Fig. 2](#).

1.3 The analytical procedure appears in the following order:

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1.4 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

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 and health practices and determine the applicability of regulatory limitations prior to use. See 6.4, 6.6, 6.7 and Section 8 for specific warning statements.*

2. Referenced Documents

2.1 *ASTM Standards:*²

[D1193 Specification for Reagent Water](#)

[D3049 Test Method for Synthetic Anionic Ingredient by Cationic Titration](#)

¹ This test method is under the jurisdiction of ASTM Committee D12 on Soaps and Other Detergents and is the direct responsibility of Subcommittee D12.12 on Analysis and Specifications of Soaps, Synthetics, Detergents and their Components. Current edition approved Jan. 1, 2014. Published February 2014. Originally approved in 1990. Last previous edition approved in 2005 as D5070-90(2005). DOI: 10.1520/D5070-90R14.

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.

3. Summary of Test Method

3.1 Quaternary ammonium compounds present in fabric softeners, as the active materials, are titrated potentiometrically in an aqueous medium with a standard solution of sodium lauryl sulfate using a nitrate ion-selective electrode. In this potentiometric titration, the reaction involves the formation of a complex between the quaternary ammonium compound and the anionic surfactant which then precipitates. At the end point, the nitrate ion electrode appears to respond to an excess of titrant with a potential change large enough to give a well defined inflection in the titration curve. Alternatively the quaternary ammonium compound can be first complexed with an excess of standard sodium lauryl sulfate; the excess sodium lauryl sulfate is titrated potentiometrically with standard Hyamine 1622.³

4. Significance and Use

4.1 This test method is used to determine the quaternary ammonium salts commonly found in fabric softeners. Quaternary ammonium compounds being the active ingredients in fabric softeners requires accurate determination to assess the cost and performance of such compounds.

5. Apparatus

5.1 *Autotitration System*—buret with 10 or 20 mL capacity;⁴ magnetic stirrer;⁵ evaluating ruler.⁶

5.2 *Electrodes*—(1) nitrate specific ion electrode;⁷ (2) surfactant electrode;⁸ (3) Ag/AgCl reference electrode.⁹

³ The sole source of supply of Hyamine 1622 known to the committee at this time is Gallard Schlesinger Manufacturing Corp., 584 Mineola Ave., Carle Place, NY 11514. 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.

⁴ Metrohm-Brinkman E-536, or equivalent, has been found satisfactory. Available from Brinkman Instruments Inc., Cantiague Rd., Westbury, NY 11590.

⁵ Potentiograph/E-535 and Dosimat/E-459, or equivalent, have been found satisfactory. Available from Brinkman Instruments Inc., Cantiague Rd., Westbury, NY 11590.

⁶ Evaluating Ruler EA-893, or equivalent, has been found satisfactory. Available from Brinkman Instruments Inc., Cantiague Rd., Westbury, NY 11590.

⁷ Orion Model 93.07, or equivalent, has been found satisfactory. Available from Orion Research Inc., 529 Main St., Boston, MA 02129.

⁸ Orion Model 93.42, or equivalent, has been found satisfactory. Available from Orion Research Inc., 529 Main St., Boston, MA 02129.