



Designation: E 2180 – 01

Standard Test Method for Determining the Activity of Incorporated Antimicrobial Agent(s) In Polymeric or Hydrophobic Materials¹

This standard is issued under the fixed designation E 2180; 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 reappraisal. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reappraisal.

INTRODUCTION

Polymeric materials such as vinyl pool liners, shower curtains, and various medical devices are treated frequently with incorporated or bound antimicrobial agents. Practices G 21 and G 22 are used to determine the ability of polymer materials to resist microbial attack or staining (see also Practice E 1428); however, none of the methods permit quantitative evaluations of incorporated antimicrobial activity.² These antimicrobials typically require contact with the microbial cell for maximal activity. When aqueous based bacterial inoculum suspensions are applied onto a preservative-treated plastic or other hydrophobic material, the surface tension of the polymer often causes the inocula suspension to dome. Bacteria within the drops of inoculum may not contact the treated surface if the challenged surface does not dry, or upon drying, cells may become layered. This test standard involves an agar slurry inoculum vehicle that provides a relatively uniform contact of the inocula with antimicrobial-treated hydrophobic surfaces.

1. Scope

1.1 This test method is designed to evaluate (quantitatively) the antimicrobial effectiveness of agents incorporated or bound into or onto mainly flat (two dimensional) hydrophobic or polymeric surfaces. The method focuses primarily on assessing antibacterial activity; however, other microorganisms such as yeast and fungal conidia may be tested using this method.

1.2 The vehicle for the inoculum is an agar slurry which reduces the surface tension of the saline inoculum carrier and allows formation of a “pseudo-biofilm,” providing more even contact of the inoculum with the test surface.

1.3 This method can confirm the presence of antimicrobial activity in plastics or hydrophobic surfaces and allows determination of quantitative differences in antimicrobial activity between untreated plastics or polymers and those with bound or incorporated low water-soluble antimicrobial agents. Comparisons between the numbers of survivors on preservative-treated and control hydrophobic surfaces may also be made.

1.4 The procedure also permits determination of “shelf-life” or long term stability of an antimicrobial treatment which may be achieved through testing both non-washed and washed samples over a time span.

1.5 Knowledge of microbiological techniques is required for these procedures.

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.*

2. Referenced Documents

2.1 *ASTM Standards:*³

E 1054 Practice for Evaluation of Inactivators of Antimicrobial Agents used in Disinfectant, Sanitizer, Antiseptic, or Preserved Products

E 1428 Test Method for Evaluating the Performance of Antimicrobials in or on Polymeric Solids Against Staining by *Streptovorticillium reticulum* (A Pink Stain Organism)

G 21 Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi

G 22 Practice for Determining Resistance of Synthetic Polymeric Materials to Bacteria

3. Terminology

3.1 *Definitions:*

3.1.1 *agar slurry, n*—a semi-gelatinous liquid formed when 3 g/L agar-agar is added to a 0.85 % saline solution.

¹ This test method is under the jurisdiction of ASTM Committee E35 on Pesticides and Alternative Control Agents and is the direct responsibility of Subcommittee E35.15 on Antimicrobial Agents.

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² Price, D.L., A.D. Sawant, and D.G. Ahearn. 1991. Assessment of the antimicrobial activity of an insoluble quaternary amine complex in plastics. *J. Industr. Microbiol.* Vol 8 (No.2):83-89.

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.