As seen during the EvSOP presentation at ICPIC 2025

Microbial Wipe Method Review

Overview

The assessment of cleaning and disinfecting practices depends on the validated effectiveness of the products applied. Pre-moistened wipes are widely used in healthcare, laboratory, and domestic settings due to their accessibility and the perception of convenience. Not all wipes function identically; therefore, thorough evaluation is necessary to determine if a wipe is suitable for general cleaning or disinfection against specific pathogens.

Evaluation incorporates controlled scientific methodologies and practical considerations, as performance varies with wipe composition and laboratory testing techniques. Products undergo standard laboratory assessments that closely mimic real-world scenarios prior to broad adoption. These studies serve to verify manufacturer claims and confirm adherence to public health standards and regulatory guidelines.

Introduction

Wipes are utilized to clean and disinfect surfaces. Before use, performance data should be provided to support efficacy claims. A systematic evaluation protocol begins with standardized procedures tailored to the intended application of the product. Variables considered include target microorganism types, surface materials, and practical wiping conditions. By combining laboratory controls with real-world application parameters, researchers evaluate wipe performance under both ideal and practical circumstances.

Performance testing methods are designed for comprehensiveness, emphasizing reproducible and reliable results. Laboratory assays simulate contamination and wiping actions, measuring both debris removal and pathogen reduction. These tests differentiate between wipes that merely relocate contaminants and those that lower microbial presence on surfaces.

Outcomes from these evaluations inform regulatory decisions and purchasing within various sectors, ensuring that only wipes meeting established performance criteria are utilized in critical environments. Wipe performance evaluation can involve 1) laboratory-based methods and 2) in-use studies. This chapter addresses laboratory methods for assessing cleaning, bacterial removal, and disinfection.

Variables in Laboratory Testing

Numerous variables affect laboratory testing of wipes. Factors include the type and concentration of microorganisms, wipe material, cleaning/disinfectant formulation and saturation, test surface characteristics, and wiping parameters such as pressure, duration, and motion. Environmental conditions

like temperature and humidity may also influence results. Control and documentation of these factors are important to ensure robust, comparable outcomes across studies.

Laboratory assessments may focus on cleaning efficiency—removal of soil and microbes—or antimicrobial efficacy—the reduction of viable pathogens. Each aspect requires specialized methodologies, such as swab sampling, plating, or molecular assays. Experimental design seeks a balance between real-world resemblance and repeatability, often using standardized organisms and surfaces for reliable comparison.

Wipe testing involves multiple variables: microorganism types, test surfaces, operator technique, culture methods, single versus reusable wipes, wiping method, enumeration approach, environmental conditions, contact times, recovery efficiency, and neutralizer use. Each of these elements is discussed in the context of generalized wiping studies.

Wiping Lab Studies

A typical laboratory wiping study involves several steps. First, the microorganisms of interest are cultivated under controlled conditions to produce a defined inoculum. The inoculum is then applied to a representative test surface and allowed to dry. The prescribed wipe, pre-saturated or moistened as per protocol, is then employed with specified parameters of pressure, motion, and contact time.

Residual microbes are recovered from the surface, commonly through swab sampling or elution, and subsequently quantified using standard microbiological or molecular techniques. Important variables throughout the process include microbe recovery efficiency, presence of residual disinfectants, and consistent operator technique.

Microbial reduction before and after wiping provides a measure of wipe efficacy. Such quantitative data facilitates product comparisons and supports compliance with regulatory guidelines.

The following stepwise protocol is typically used:

1. Cultivation of microorganisms to generate an inoculum.
2. Contamination and drying of the test surface.
3. Application of the wipe using standardized conditions.
4. Extraction and recovery of remaining microbes.
5. Enumeration of extracted organisms.
6. Calculation and reporting of performance efficacy.

Standardized methods and regulatory protocols have been developed to harmonize testing across products and laboratories. Selection of standards depends on the microbe type, product claims, and intended environment. Regulatory acceptance is based on adherence to peer-reviewed methodologies, which establish scientific validity.

Recognized organizations have defined antimicrobial wiping methods, including:

1) AOAC Method 961.02, Germicidal Spray Products as Disinfectants modified for wipes.
2) ASTM E2362 – 09, Evaluation of Pre-saturated or Impregnated Towelettes for Hard Surface Disinfection.

3) ASTM E2967-15, Standard Method for Assessing the Ability of Pre-wetted Towelettes to Remove and Transfer Bacterial Contamination on Hard, Non-Porous Environmental Surfaces Using the Wiperator.
4) BS EN 16615:2015, Quantitative test method for the evaluation of bactericidal and yeasticidal activity on non-porous surfaces with mechanical action employing wipes in the medical area (4-field test) Test method and requirements (phase 2, step 2).
5) EPA MB-09-08, Disinfectant Towelette Test: Testing of *Staphylococcus aureus, Pseudomonas aeruginosa*, and *Salmonella enterica*.
6) EPA MB-23-05, Disinfectant Towelette Test: Testing of *Mycobacterium bovis* (BCG).

Methodologies specify acceptable microbial reduction levels tied to regulatory requirements, test organism categories, and intended applications. Validation and quality control procedures, including controls and documentation, support reproducibility and transparency.

While ASTM E2967-15 directly evaluates microbial removal, other protocols have been adapted for cleaning studies. Modifications assess removal, microbial entrapment in wipes, and transfer to clean surfaces. EN-16615 is recognized by many as a good representative of actual wiping performance .

Defining Critical Aspects of Each Step

Test design requires thorough planning regarding microorganism selection, inoculum preparation, and environmental conditions. Variables such as organic soil presence, surface type, contact time, and wiping technique affect results. Testing distinguishes between “clean” and “dirty” conditions, where soils can increase test difficulty.

Appropriate handling and preparation of test organisms ensures relevance to real-world contamination. This includes inoculation, drying, wiping action, applied pressure, and timing. Standardization maximizes comparability and regulatory compliance.

Tests may use Gram-negative and Gram-positive bacteria, bacterial spores, fungal spores, yeasts, enveloped and non-enveloped viruses, depending on the product's claims. Recent studies utilize biofilms for added challenge. The EPA recommends specific microorganisms for baseline testing.

Preparation of test microbes involves culturing bacteria/yeast in broth or on agar, suspending them in fluid with or without proteinaceous soil (usually 5% w/v), according to published protocols. Tests run without such soil are classified as “clean.”

Summary

This document presents recommended approaches for designing and conducting surface disinfectant wipe assessments, highlighting microorganism selection, inoculum preparation, and environmental control. It details methods for differentiating “clean” and “dirty” conditions, preparing test microbes, and adopting standardized protocols for reproducibility and regulatory alignment. The process includes inoculation, drying, applying wipe, recovery of residual microbes, and quantitative analysis.

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