Summary of Studies and White Papers Conducted for PreventX 24/7™

Foreword

PreventX 24/7™ is the result of years of research and testing, along with advancements in application engineering and surface modification technology.

Below is the history of proprietary ownership through its lifespan and development:

1. The silane quat antimicrobial technology and products were originally developed by Dow Corning Corporation in the 1970's. The manufacturer of PreventX 24/7™ was involved in the manufacturing and processing of this technology when it was developed.
2. Aegis Environments was established in 1990 to further develop and commercialize the unique antimicrobial technology, as Aegis, and purchased Dow Corning's Antimicrobials Business in 1995.
3. PreventX 24/7™ is an EPA registered antimicrobial (EPA Reg. No. #91116-1).
4. The basic chemistry of the active ingredients and the manufacturing process has remained unchanged throughout the lifespan of this product.

What follows is a list of studies conducted on the original compound developed by Dow Corning Corporation, under the various marketed names including AEM 5700 and Aegis Microbe Shield. The CAS number established for PreventX 24/7™ is 27668-52-6 which is DOW AEM 5700.

These documents have been separated into relative retail categories for ease of research.

Please ask your NewEraSOS representative for a copy of these studies.

Studies

1. 3A2_Surface Kinetic Test Method for Determining Rate of Kill by an Antimicrobial Solid: Applied and Environmental Microbiology, Nov. 1978, p. 700-704

   SUMMARY:
   An antimicrobial-surface kinetic test which maximizes probability of cell-to-surface contact has been developed. The measurement of rate of kill by a non-leaching antimicrobial surface is based on the number of surviving bacterial cells at specific times of exposure to various amounts of total treated surfaces area of test substrate. This method gives information for direct comparison of rate of kill for a variety of antimicrobial surfaces in terms of rate of kill per square centimeter of surface area. Data obtained by this method can also give valuable dose response application information as an indication of the exponential efficiency of concentration in terms of treated surface area.

2. 4A2_Evalution of Effects on Elevated Levels of Normal Skin Bacterial Flora with Fabrics Treated with 3-(Trimethoxysilyl) Propyldimethyloctadecyl Ammonium Chloride: By W. Curtis White, AEGIS Environments, Midland, MI Benny L Triplett, Burlington Industries, Greensboro, NC Rev 05/2005

   SUMMARY

   Concern has been expressed that antimicrobial agents used on fabrics can affect normal skin bacterial flora and give rise to adapted or dominant species. This imbalance could have negative effects. This work was undertaken to: (A) evaluate the effects of fabrics treated with 3-(trimethoxysily) propyldimethyloctadecyl ammonium chloride (mPale Antimicrobial) on elevated populations of normal skin bacteria under an occlusive dressing and (B) evaluate the retrievable counts of the target bacteria associated with treated and nontreated fabrics.

   Results show clearly that fabric treated with 3-(trimethoxysily) propyldimethyloctadecyl ammonium chloride exerted no untoward effects on the elevated skin target bacterial populations under the occlusive dressing when compared to the untreated fabric. Testing of the target bacterial flora in the fabric itself showed 99.96 to >99.99 percent reduction in the treated fabric as compared to the untreated fabric.

3. 5B33_After the Flood: Aeromicrobial Control in an Extensively Damaged Hospital, Rev 06/2005

   SUMMARY

   The natural contamination of a building environment with fungal spores and bacteria and the escalation of that contamination with wetting can be reversed and controlled by the extensive surface application of a silane antimicrobial. The findings show that this unique treatment is an important interdictive measure for the reduction of colonization and aerosolization of fungal flora. This unique control strategy provides an exceptional level of continuing microbial protection and should be considered as part of infection prophylaxis in medical care facilities.

4. 5E5_Reducing Microbial Contamination in Hospital Blankets: by James W. Krueger, Rev 01/2003

   SUMMARY

   The In-use study on Spartan Mills blankets correlates well with the simulated study undertaken earlier in the year. Both studies clearly show that blankets protected by the AEGIS Microbe Shield technology have a significantly lower bioburden and will present less of a risk in the patient environment. Historical data generated by American Hospital Supply and Dow Corning Corporation support these findings.

   These data generated by university, medical and industrial laboratories represent some of the most extensive microbiological work ever performed on antimicrobial treated substrates for use in the medical community. The control of the microoganisms is impressive and provides numerous benefits.

   - Prevents blanket staining due to mold and mildew growth that occurs on damp blankets prior to laundering.
   - Controls blanket deterioration due to microbial growth that occurs on blankets during storage.
   - Controls odors caused by bacteria and fungus normally found in blankets.
   - Provides three (3) times more protection from bacteria and fungus than an untreated blanket.

Spartan Mills blankets, protected by the Aegis Microbe Shield technology, clearly provide an added step towards asepsis for the health care environment.

5. 6C_28. Sustained Aeromicrobiological Reductions Utilizing Silane-modified quaternary amines applied to carpeting: preliminary data from an observational study of commercial buildings: W.C. White, R.L. Gettings, and R.A. Kemper Developments in Industrial Microbiology, Volume 31 1990 Society for Industrial Microbiology

   SUMMARY

   Microoganisms are increasingly identified as etiologic agents in Building Related Illnesses (BRI). Infectious, allergenic, toxic, and irritational presentations by building occupants are causally linked to microbial infestation of the workplace. In field studies of schools and office buildings where BRI symptoms were manifest, data support the hypothesis that illnesses result from exposure to excessive bioaerosols. The data also confirm that microbial prophylaxis can be achieved by affixing silane-modified quaternary amines to interior surfaces. These agents chemically react with numerous substrates to produce durable antimicrobial surfaces which reduce microbial populations and inhibit recolonization. The functionality of these activated surfaces enables the destruction of microorganisms which contact them, thereby reducing aerobiological presence.

6. 8A8b_Antiviral Activity of a Surface-bonded Quaternary Ammonium Chloride: I-Fu Tsao and Henry Y. Wang, Department of Chemical Engineering University of Michigan

   SUMMARY

   The surface-bonded quaternary ammonium chloride (QAC) can effectively absorb and inactivate viruses based on our initial experimental results. HSV-1, and enveloped virus, is more susceptible than the non-enveloped bacteriophage T2 to the QAC treatment. However, as a non-specific absorption process, both the rate and capacity reduced due to the competitive binding of the protein molecules. Thermo-inactivation and surface-bonded QAC treatment were compared in terms of titer reduction and remaining functional activity of the model protein, B-lactamase. Process modeling and computer simulation enable us to predict the breakthrough curves of a virus absorption column. Choosing a sterilization criterion has to be compromised with reduced protein recovery.

7. Fungal Remediation and Protecting Antimicrobial Treatment of a Ten Story Grossly Contaminated Hospital, Kumar S, AQ Consultants, Satish Bakhada, AQ Consultants, and White WC Aegis Environments,

   SUMMARY

   With the continuing increase in the number of severely immunocompromised patients, hospitals are faced with the growing problem of invasive aspergillosis and other opportunistic fungal infections. Since treatments of these infections are difficult and outcome is often fatal, preventive measures are of major importance in the control of invasive filamentous fungal infections. Data from the study indicates that surfaces modified with silane antimicrobial (Aegis antimicrobial, SiQuat) provides substantive reduction of airborne microbial concentration even in extreme environmental conditions with sustained control of microbial levels and provides a cleaner, healthier environment of care. When viewed collectively, the safety,

efficacy, and durability of this technology provide a unique opportunity to control the risks associated with microbial contamination in buildings without continuous care of the hard to reach surfaces.

8. List of Antimicrobial Pathogens Inactivated by the compound in PreventX 24/7™ with Study References.

Informal Studies

1. 0001_NE015 Hospital Room Study: 8 Week Study July – September 2017, Dr. Adams
2. 0002_NE020 Medical Suite Study: 6 Week Study of 20 Different High and Low Touch sites, Dr. Adams
3. 0003_NE025 30 Month Field Study in Hospital: Improved Control of Microbial Exposure Hazards in Hospitals: Dr. Adams
4. 0004_NE030 Sports Facility Usage and Test Data: PreventX24/7 – Highlighted Usage and Tests Performed, Dr. Adams
5. Norovirus Surface Testing for Cruise Line, JennsCo's, March 2014
6. Amazing ATP Test Results Utilizing PreventX 24/7 Antimicrobial Coating, JennsCo

Whitepapers

1. 3A4 – Evaluating Antimicrobial Prop of Silane Modified Surfaces: By W. Curtis White, President, Aegis Environmental Management, Inc. and Richard L. Gettings Supervisor of Microbiology Dow Corning Corp.,

   SUMMARY
   Chemical phenomena that react and associate silanes, quaternary ammonium compounds, and silane quaternary ammonium compounds are well understood. The ability to create essentially irreversible molecular coatings of cationic silanes on molecular coatings of cationic silanes on surfaces and the ability of these modified surfaces to kill and/or control microorganisms has been demonstrated. A large number of microbiological techniques have been found useful in determining the antimicrobial activity of surfaces treated with immobilized antimicrobials and give us considerable insight into the mode of antimicrobial action that these compounds exert.

2. 4B2_How Antimicrobial Treatment Can Improve Nonwovens: American Dyestuff Reporter June 1984, Rev 12/2004

   SUMMARY
   Increasing the value and performance of nonwovens is entirely feasible by incorporating the Aegis Microbe Shield (formerly known as Sylgard) to control microbially related problems. Fabrics which have been treated are more hygienically suitable for surgical/medical uses, diapers, filters, etc., due to the durable, broad spectrum antimicrobial activity, and safety of the antimicrobial treatment. Control of deterioration and defacement and elimination of microbially related odors has been found to enhance the value and performance of both disposable and nondisposable nonwoven products.

Efforts continue, we can say, to expand the use of the Aegis Microbe Shield Program to areas such as food packaging, civil engineering and textile fabrics where control of microbially related problems is important in the end application.

3. 6 PreventX 24/7 Antimicrobial; Theoretical, Laboratory & Field Experience Durability & Antimicrobial Efficacy: A Healthcare Perspective:

SUMMARY

Reducing doe of microorganisms in the healthcare environment by eliminating reservoirs and transfer surfaces using safe and effective antimicrobial treatments is critical to reducing microbial dose and has been clearly demonstrated with the use of the bound Aegis Microbe Shield (AEM) antimicrobial technology on a wide range of substrates and clinical settings.

To benefit from the demands for antimicrobial/antibacterial products as well as the antimicrobial / antibacterial performance needs of the medical products world, manufacturers have a choice. In choosing, they should utilize a treatment that provides for a microbial control claim and an antimicrobial finish for their textile products consistent with the needs of their target consumers. This selection should be done by considering the following:

a. Adopting a non-leaching antimicrobial that doesn't pose the risk of crossing the skin barrier or negatively affecting the normal microbial flora of the skin. If it creates a "zone of inhibition" or must integrate into the all to have function, it leaches or moves and has the potential to cause problems to people and the environment.
b. Adopting an antimicrobial technology with a proven history of use. This will help shorten the timelines in bringing products with an antibacterial / antifungal / odor-reducing, antimicrobial feature to market.
c. Adopting an antimicrobial technology that is adaptable across many utilities and stand up to use and abuse conditions through the life of the good.
d. Adopting a non-leaching antimicrobial that doesn't pose the risk of creating adaptative resistant microorganisms.
e. Adopting an antimicrobial technology that is registered with the EPA, the EU BPD and other regulatory agencies for the specific product it is applied to.
f. Adopting an antimicrobial technology that can be tested for proper application at the mill or at the retailers. A verifiable quality assurance program should be a key component of any application process.
g. Adopting an antimicrobial technology that has technical and marketing support.

4. 6E_Modification of Interior Surfaces Using AEGIS™ Antimicrobial System to Reduce Filtration Requirements for Bioaerosol Control in a Hospital: Richard A. Kemper, Carol Jacobson, R.N.

   SUMMARY

   In completing this study, it appears to the authors that hospitals no longer have to rely just on air filtration to reduce exposures to infective, allergenic and toxigenic organisms. The use of Aegis Antimicrobial has shown to be very effective in not only stopping the spread of such organisms, but also in curtailing new growth.

   The risks associated with microorganisms in a hospital can be greatly reduced by the modification of interior surfaces with Aegis antimicrobial. This work demonstrates that surface modification, when used in conjunction with proper filtration, can produce the least possible exposure level for patients and staff. It also suggests the need for routine microbiological sampling of hospital air to ensure that ambient microbial densities remain low.

   This work also identifies the potential significance on indoor microbial aerosolization on the bio loading of filtration media in recirculating systems and provides an alternative strategy to increased filtration requirements for effective microbial exposure control. This is achieved without increasing ventilation capacity and its associated energy consequences.

5. In Vivo Study of an Antimicrobial Surgical Drape System
6. Interaction of Viral Particles with a Quaternary Ammonium Chloride
7. 30-Month Field Study of Microbial Exposure Hazards in Hospitals
8. Surface-Bonded Antimicrobial Activity of an Organosilicone
9. Durable Defense: Non-Leaching Coatings

Testing Data

1. 6C17-3_Certificate of Analysis mPale Antimicrobial: mPact Environmental, 05/26/2006
2. PreventX 24-7 Test Nursing Home Summary 08-28-2015: Assessing The Efficacy and Endurance of PreventX 24/7 Antimicrobial Surface Barrier Wipes in a Skilled Nursing Environment, “Confidential Draft Do Not Distribute” Watermark
3. SanAir Technologies Laboratory Analysis Report prepared for JennsCo: U. of Ill Football, 08/27/2010
4. SanAir Technologies Laboratory Analysis Report prepared for JennsCo: U of Ill Football, 09/01/2010
5. SanAir Technologies Laboratory Analysis Report prepared for JennsCo: M/Y Diamond, 05/15/2014
6. SanAir Technologies Laboratory Analysis Report prepared for JennsCo: “Redacted”, 11/06/2014
7. Boeing Test mPale Antimicrobial, Dr. Sims Adams, April 16,2007