STUDY TITLE

Evaluation of Antimicrobial Activity of UV Illumination / Hydroxyl Exposure

Test Organisms:

Aspergillus niger (ATCC 16404)
Listeria monocytogenes (ATCC 19111)

PRODUCT IDENTITY

Odorox Mobile Disinfection Unit Hydroxyl Generator

AUTHOR

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STUDY COMPLETION DATE

November 26, 2008

PERFORMING LABORATORY

ATS Labs
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SPONSOR

Safety Performance Solutions, Inc.
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PROJECT NUMBER

A07003

STUDY REPORT

GENERAL STUDY INFORMATION

Study Title: Evaluation of Antimicrobial Activity of UV Illumination / Hydroxyl Exposure

Project Number: A07003

TRF Number: SPS01110608.CUST

TEST SUBSTANCE IDENTITY

Test Substance Name: Odorox Mobile Disinfection Unit Hydroxyl Generator

STUDY DATES

Date Sample Received: September 30, 2008
Study Initiation Date: November 11, 2008
Experimental Start Date: November 12, 2008
Experimental End Date: November 17, 2008
Study Completion Date: November 26, 2008

Test Organism	ATCC #	Culture Medium	Subculture Plate Medium
Aspergillus niger	16404	Sabouraud Agar Modified	Sab Dex Agar
Listeria monocytogenes	19111	Brain Heart Infusion broth	Tryptic Soy Agar with 5% Sheep's Blood (BAP)

The microorganisms used in this study were obtained from the American Type Culture Collection (ATCC), Manassas, Virginia.

Test Exposure: *Aspergillus niger* (ATCC 16404)= 24 hours
Listeria monocytogenes (ATCC 19111)= 4 hours

Exposure Temperature: Room temperature (21-22°C)

Number of Carriers Tested/lot: Duplicate carriers per exposure time, per test organism utilizing two carrier types, 1" x 1" stainless steel and 1" x 1" cotton fabric

Soil Load Description: No organic soil load required

Neutralizing Subculture Medium: Letheen Broth with 0.07% Lecithin and 0.5% Tween 80

EXPERIMENTAL DESIGN

A room (approximately 14' by 24' x 10') was prepared for testing by sealing all HVAC vents and the single doorway with 4 mil plastic sheeting and duct tape. The Odorox Mobile Disinfection Unit Hydroxyl Generator was powered on and was allowed to run for 59 minutes in the prepared room. Duplicate test carriers, per carrier type, per test organism, inoculated with a dried film of test culture, were placed within the room. Fabric carriers were allowed to hang freely, while stainless steel carriers were exposed within Petri dishes with the dish lids fully ajar. Following exposure, the carriers were neutralized, mixed and assayed for survivors. Appropriate purity, carrier sterility, neutralizing subculture medium sterility, and carrier quantitation controls were performed. Percent and $\log_{10}$ reductions were determined for the test carriers as compared to the carrier quantitation control carriers (evaluated immediately after drying).

TABLE 1: CONTROL RESULTS

Type of Control		Results	
		Aspergillus niger **(ATCC 16404)**	***Listeria monocytogenes*** **(ATCC 19111)**
Purity Control		Pure	Pure
Neutralizing Subculture Medium Sterility Control		No Growth	
Carrier Sterility Control	Stainless Steel	No Growth	
	Cotton Fabric	No Growth	

TABLE 2: EVALUATION OF CARRIER QUANTITATION CONTROL DATA (Evaluation immediately after drying)

Test Organism	Carrier type	Average CFU/carrier	Average Log_{10}
Aspergillus niger (ATCC 16404)	Stainless Steel	3.43×10^5	5.519
	Cotton Fabric	2.95×10^5	5.470
Listeria monocytogenes (ATCC 19111)	Stainless Steel	3.77×10^6	6.574
	Cotton Fabric	3.10×10^5	5.49

CFU = Colony Forming Unit

TABLE 3: EVALUATION OF CARRIER QUANTITATION CONTROL DATA
(Evaluation following the test exposure period)

Test Organism	Carrier type	CFU/carrier	Log_{10}
Aspergillus niger (ATCC 16404) (24 hours)	Stainless Steel	2.10×10^5	5.322
	Cotton Fabric	9.2×10^4	4.96
Listeria monocytogenes (ATCC 19111) (4 hours)	Stainless Steel	4.46×10^5	5.649
	Cotton Fabric	3.48×10^3	3.542

CFU = Colony Forming Unit

TABLE 4: EVALUATION OF TEST CARRIER DATA

Test Substance	Test Organism	Carrier type	Average CFU/carrier	Average Log_{10}
Odorox Mobile Disinfection Unit Hydroxyl Generator	*Aspergillus niger* (ATCC 16404) (24 hours)	Stainless Steel	1.7×10^5	5.23
		Cotton Fabric	1.4×10^5	5.12
	Listeria monocytogenes (ATCC 19111) (4 hours)	Stainless Steel	2.0×10^5	5.30
		Cotton Fabric	4.28×10^3	3.625

CFU = Colony Forming Unit

TABLE 5: CALCULATED VALUES

Test Substance	Test Organism	Carrier type	Percent Reduction	Log_{10} Reduction
Odorox Mobile Disinfection Unit Hydroxyl Generator	*Aspergillus niger* (ATCC 16404) (24 hours)	Stainless Steel	50.4%	0.29
		Cotton Fabric	52.5%	0.35
	Listeria monocytogenes (ATCC 19111) (4 hours)	Stainless Steel	94.7%	1.27
		Cotton Fabric	98.6%	1.87

CFU = Colony Forming Unit

CONTROL RESULTS

The results of controls run for purity, carrier sterility, neutralizing subculture medium sterility, and carrier quantitation were all acceptable.

ANALYSIS

Odorox Mobile Disinfection Unit Hydroxyl Generator, demonstrated a 50.4% (0.29 log_{10}) reduction on stainless steel and a 52.5% (0.35 log_{10}) reduction on cotton fabric for *Aspergillus niger* (ATCC16404) following a 24 hour exposure period when tested at room temperature (21-22°C).

Odorox Mobile Disinfection Unit Hydroxyl Generator, demonstrated a 94.7% (1.27 log_{10}) reduction on stainless steel and a 98.6% (1.87 log_{10}) reduction on cotton fabric for *Listeria monocytogenes* (ATCC 19111) following a 4 hour exposure period when tested at room temperature (21-22°C).

This study was performed following ATS Labs' Standard Operating Procedures (SOPs) and internal quality systems.

PROFESSIONAL PERSONNEL INVOLVED:

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