P³ Shield

30 Day Virus Prevention

US Patented Solution to
Shield, Prevent and Protect

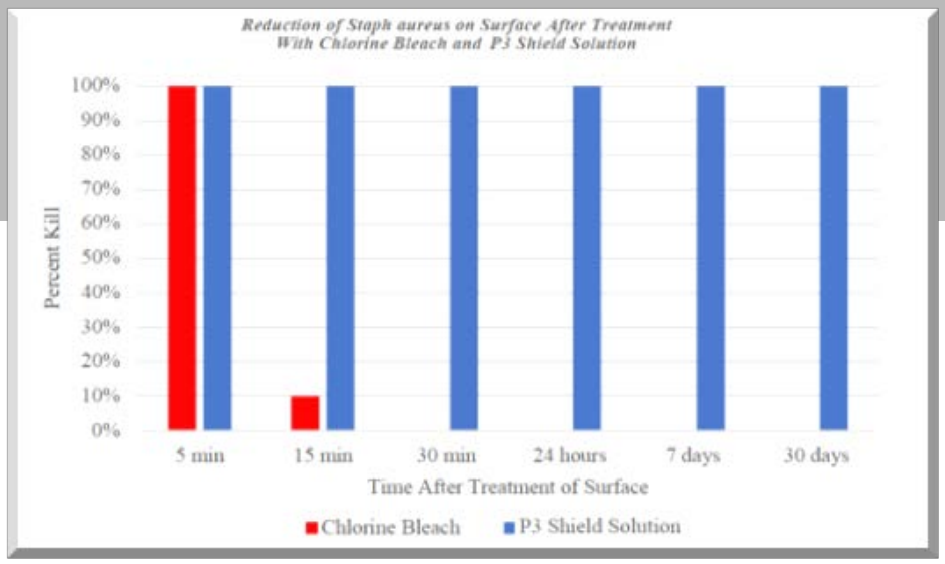
"A nano-bonding solution effective against virus/bacteria for a minimum of 30 days"

P³ Shield is a distributor for Medetech Corporation, Medecide(TM) Product Solution. The Founder and CEO of Medetech Corporation is the Founder & CEO of OxiScience LLC.

HOW IT WORKS

Where your standard solutions eliminate virus/bacteria on contact; once the solution evaporates it is no longer effective in killing or eliminating virus/bacteria. It is a once and done solution.

Independent lab test proves the effectiveness of the bonding solution in eliminating viruses and bacteria for a minimum of 30 days.



TIME IS NOW

We find ourselves at the dawn of a new era. An era of social distancing, and an era with heightened focus on health safety that many of us have never seen in our lifetime. What seemed like a distant concern yesterday is a paramount concern today....

Now is the time to take the first step to returning to a life that we all know and treasure with our families and friends. A life with the eagerness to safely come together for the greater good of all mankind.

The first step to reconnecting with the outside world must be creating the safest environment possible. Creating that environment starts with P^{3}Shield LLC.

Armed with the products offered by P^{3}Shield LLC you can take comfort in knowing that you have taken proactive steps and created a safe environment that keeps yourself, family, friends, employees and customers as well as everyone we interact with on a daily basis healthy.

ABOUT

P^{3}Shield is a company focused on distributing a packaged preventive solution kit for eliminating the virus/bateria off hard and soft surfaces. Created for home, business, and institutional owners. The "Preventative Solution" kits and bulk solution products manufactured by the company OxiScience LLC, which combines research and technology to produce effective microbial solutions for end-users.

This solution is also capable of eliminating the virus off interiors and exteriors of private and commercial vehicles. The one-gallon solution, self-administered application kit will cover an estimated 5,000 -10,000 square feet of surface area.

The treated surfaces are safe to touch, the formula is water based and is simple to apply with traditional equipment and methods. After application, the solution will remain active for 30 days or more on the surface.

US010028482B2

(12) **United States Patent**
Cao et al.

(10) **Patent No.: US 10,028,482 B2**
(45) **Date of Patent: Jul. 24, 2018**

(54) **DISINFECTING AND DEODORIZING COMPOSITIONS AND METHODS WITH NOVEL POLYMERIC BINDING SYSTEM**

(71) Applicants: **Zhengbing Cao**, Bothell, WA (US); **Xinbo Sun**, Bothell, WA (US); **Simon Johnston**, Bellevue, WA (US); **Jeffrey F. Williams**, Langley, WA (US)

(72) Inventors: **Zhengbing Cao**, Bothell, WA (US); **Xinbo Sun**, Bothell, WA (US); **Simon Johnston**, Bellevue, WA (US); **Jeffrey F. Williams**, Langley, WA (US)

(73) Assignee: **OxiScience LLC**, Redmond, WA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **14/838,717**

(22) Filed: **Aug. 28, 2015**

(65) **Prior Publication Data**

US 2016/0058008 A1 Mar. 3, 2016

Related U.S. Application Data

(60) Provisional application No. 62/043,151, filed on Aug. 28, 2014.

(51) **Int. Cl.**

A01K 1/015	(2006.01)
A01N 43/50	(2006.01)
A61K 31/53	(2006.01)
A61K 31/4166	(2006.01)
A61L 15/46	(2006.01)
A61L 15/22	(2006.01)
A61L 15/28	(2006.01)
A01N 43/66	(2006.01)
A01N 59/00	(2006.01)
A61K 31/00	(2006.01)

(52) **U.S. Cl.**

CPC ***A01K 1/0154*** (2013.01); ***A01K 1/0152*** (2013.01); ***A01K 1/0155*** (2013.01); ***A01N 43/50*** (2013.01); ***A01N 43/66*** (2013.01); ***A01N 59/00*** (2013.01); ***A61K 31/00*** (2013.01); ***A61K 31/4166*** (2013.01); ***A61K 31/53*** (2013.01); ***A61L 15/22*** (2013.01); ***A61L 15/28*** (2013.01); ***A61L 15/46*** (2013.01); *A61L 2300/204* (2013.01); *A61L 2300/404* (2013.01); *A61L 2300/606* (2013.01)

(58) **Field of Classification Search**

CPC ... C07C 231/12; C07C 235/76; C07C 201/12; C07C 253/30; C07C 205/12; C07C 255/50; A01N 59/00; A01N 25/08; A01N 25/22; A01N 25/26; A01N 33/12; A01N 43/50; A01N 43/66; C07D 413/06; C07D 213/04; C07D 513/04; C07F 7/1852; C07F 7/1856; A61K 8/44; A61K 8/585; A61K 8/608; A61K 8/73; A61K 8/86; A61K 8/894; A61K 2039/6037; A61K 39/09; A61K 47/646; A61K 31/00; A61K 31/4166; A61K 31/53; A61K 39/092; A61K 39/095; A61K 47/4833; A61K 47/6415; A61K 47/48261; A61L 15/28; A61L 15/22; A61L 15/46; A61L 2300/204; A61L 2300/404; A61L 2300/606; A61Q 19/00; A01K 1/0152; A01K 1/0154; A01K 1/0155

See application file for complete search history.

(56) **References Cited**

U.S. PATENT DOCUMENTS

6,770,287	B1 *	8/2004	Sun	A01N 59/00 424/404
2003/0044377	A1	3/2003	Worley et al.	424/78.22
2006/0148940	A1 *	7/2006	Sun	C08K 5/0058 524/99
2009/0324536	A1	12/2009	Sun et al.	424/78.23
2010/0029797	A1 *	2/2010	Worley	A01N 59/00 521/147

OTHER PUBLICATIONS

Cerkez, "N-Halamine Biocidal Coatings via a Layer-by-Layer Assembly Technique", Langmuir, 2011, 27, 4091-4097.*
International Search Report, PCT/US2015/047212.

* cited by examiner

Primary Examiner — Audrea B Coniglio
(74) *Attorney, Agent, or Firm* — Alvin T. Rockhill

(57) **ABSTRACT**

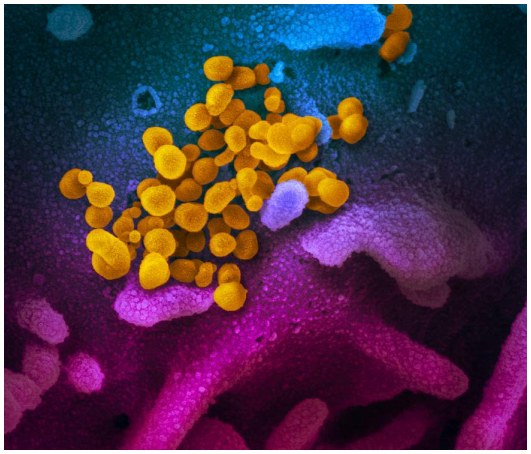
The present invention includes multifunctional compositions, methods and binding systems to provide disinfecting and deodorizing coatings for hard and soft surfaces, inorganic and organic solid surfaces and particulate media and other related substrates, including human and animal skin and skin lesions; to provide neutralizing functions for malodors generated by both human, animal and industrial fluids and solid wastes; and to provide neutralizing and degrading functions for nuisance and noxious chemicals. The present invention provides compositions and methods for producing disinfecting, oxidizing and enzyme-inhibiting fluids enabling preparation of durable, stable biocidal and deodorizing coatings and media which can be widely used for biological agent control, prevention and elimination of odors, and degradation of noxious agents susceptible to chemical oxidation, and which take forms that are inoffensive to users and offer high convenience.

47 Claims, 3 Drawing Sheets

National Institutes of Health
Turning Discovery Into Health

New coronavirus stable for hours on surfaces

SARS-CoV-2 stability similar to original SARS virus.



This scanning electron microscope image shows SARS-CoV-2 (yellow)—also known as 2019-nCoV, the virus that causes COVID-19—isolated from a patient in the U.S., emerging from the surface of cells (blue/pink) cultured in the lab.*NIAID-RML*

What

The virus that causes coronavirus disease 2019 (COVID-19) is stable for several hours to days in aerosols and on surfaces, according to a new study from National Institutes of Health, CDC, UCLA and Princeton University scientists in The New England Journal of Medicine. The scientists found that severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) was detectable in aerosols for up to three hours, up to four hours on copper, up to 24 hours on cardboard and up to two to three days on plastic and stainless steel. The results provide key information about the stability of SARS-CoV-2, which causes COVID-19 disease, and suggests that people may acquire the virus through the air and after touching contaminated objects. The study information was widely shared during the past two weeks after the researchers placed the contents on a preprint server to quickly share their data with colleagues.

The NIH scientists, from the National Institute of Allergy and Infectious Diseases' Montana facility at Rocky Mountain Laboratories, compared how the environment affects SARS-CoV-2 and SARS-CoV-1, which causes SARS. SARS-CoV-1, like its successor now circulating across the globe, emerged from China and infected more than 8,000 people in 2002 and 2003. SARS-CoV-1 was eradicated by intensive contact tracing and case isolation measures and no cases have been detected since 2004. SARS-CoV-1 is the human coronavirus most closely related to SARS-CoV-2. In the stability study the two viruses behaved similarly, which unfortunately fails to explain why COVID-19 has become a much larger outbreak.

The NIH study attempted to mimic virus being deposited from an infected person onto everyday surfaces in a household or hospital setting, such as through coughing or touching objects. The scientists then investigated how long the virus remained infectious on these surfaces.

The scientists highlighted additional observations from their study:

- If the viability of the two coronaviruses is similar, why is SARS-CoV-2 resulting in more cases? Emerging evidence suggests that people infected with SARS-CoV-2 might be spreading virus without recognizing, or prior to recognizing, symptoms. This would make disease control measures that were effective against SARS-CoV-1 less effective against its successor.

- In contrast to SARS-CoV-1, most secondary cases of virus transmission of SARS-CoV-2 appear to be occurring in community settings rather than healthcare settings. However, healthcare settings are also vulnerable to the introduction and spread of SARS-CoV-2, and the stability of SARS-CoV-2 in aerosols and on surfaces likely contributes to transmission of the virus in healthcare settings.

The findings affirm the guidance from public health professionals to use precautions(link is external) similar to those for influenza and other respiratory viruses to prevent the spread of SARS-CoV-2:

- Avoid close contact with people who are sick.
- Avoid touching your eyes, nose, and mouth.
- Stay home when you are sick.
- Cover your cough or sneeze with a tissue, then throw the tissue in the trash.
- Clean and disinfect frequently touched objects and surfaces using a regular household cleaning spray or wipe.

Article

N van Doremalen, *et al*. Aerosol and surface stability of HCoV-19 (SARS-CoV-2) compared to SARS-CoV-1. *The New England Journal of Medicine*. DOI: 10.1056/NEJMc2004973 (2020).

Who

NIAID Director Anthony S. Fauci, M.D., and Vincent Munster, Ph.D., a principal investigator in NIAID's Laboratory of Virology, are available to comment on this study.

This media availability describes a basic research finding. Basic research increases our understanding of human behavior and biology, which is foundational to advancing new and better ways to prevent, diagnose, and treat disease. Science is an unpredictable and incremental process— each research advance builds on past discoveries, often in unexpected ways. Most clinical advances would not be possible without the knowledge of fundamental basic research.

NIAID conducts and supports research — at NIH, throughout the United States, and worldwide — to study the causes of infectious and immune-mediated diseases, and to develop better means of preventing, diagnosing and treating these illnesses. News releases, fact sheets and other NIAID-related materials are available on the NIAID website.

About the National Institutes of Health (NIH): NIH, the nation's medical research agency, includes 27 Institutes and Centers and is a component of the U.S. Department of Health and Human Services. NIH is the primary federal agency conducting and supporting basic, clinical, and translational medical research, and is investigating the causes, treatments, and cures for both common and rare diseases. For more information about NIH and its programs, visit www.nih.gov

SDS

Sales Data Sheet

Anti-Viral Converter Solution

Section 1: Identification

Product identified: OxiScience Antiviral Converter

Restrictions on use or sale: None (not EPA approved)

Section 2: Hazard Identification

Regulation (EU) No 1272/2008

GHS regulations: Not classified as hazardous

CLP regulation: Not classified as hazardous

Directive 67/548/EEC: Not applicable

Directive 1999/45/EC: Not applicable

Classification system: The classification is according to the latest editions of the EU-lists and extended by company literature data. The classification is in accordance with the latest editions of international substances lists and is supplemented by information from technical literature.

Label elements:

Regulation (EC) No 1272/2008: Not regulated

Hazard pictograms: Not regulated

Signal word: Not regulated

Hazard determining components: None

Hazard statements: Not regulated

NFPA Hazard Rating (Scale 0 to 4)

Health (Blue) 0 No precaution necessary

Flammability (Red) 0 Non-combustible

Reactivity (Yellow) 0 Not reactive when mixed with water

Special (White) None

HMIS Hazard Rating (Scale 0 to 4)

Health (Blue) 0 No significant health risk

Flammability (Red) 0 Will not burn

Reactivity (Yellow) 0 Will not react, polymerize, decompose condense, or self-react. Non-explosive

Section 3: Composition/Information on ingredients

Dangerous components: None in reportable quantities

Chemical and common name	*Wt. %*	*CAS Registry*
Water	97.9 - 99%	7732-18-5
Calfax DB-45	1%	119345-04-9
Halogenated Hydantoin	<0.5%	Not disclosed
Stabilizer	<0.5%	Not disclosed
Hydroxyethyl Cellulose	<0.1%	9004-62-0

Section 4. First Aid Measures

After inhalation: Supply fresh air; consult doctor in case of complaints

After skin contact: Clean with water and soap. If skin irritation is experienced, consult a doctor

After eye contact: Remove contact lenses if worn. Rinse opened eye for several minutes under running water. If symptoms persist, consult a doctor

After swallowing: Rinse out mouth and then drink plenty of water. Do not induce vomiting. Treat symptomatically

Section 5. Fire-Fighting Measures

Suitable extinguishing media: Non-combustible

Extinguishing media: Compatible with all extinguishing media

Unusual hazards: None known

Section 6. Accidental Release Measures

Environmental precautions: No special measure required

Protective equipment: Safety glasses, nitrile gloves

Spill cleanup: Use absorbent material to gather loose material

Section 7. Handling and Storage

Safe handling: Avoid contact with eyes, skin, and clothing

Safe storage: Store in a cool, well ventilated area

Section 8. Exposure Controls and Personal Protection

Limit values: Does not contain any relevant quantities of materials with critical values that have to be monitored in the workplace.

DNEL: No further information available.

DNEC: No further information available. *General protection:* Use in a well ventilate workplace. *Eye protection:* Wear safety glasses.

Respiratory protection: Not necessary in well-ventilated areas.

Skin protection: Wear protective gloves against mechanical hazards according to NIOSH or EN 388

Body protection: Not required under normal conditions of use.

Sections 9. Physical and Chemical Properties

Appearance: Colorless liquid

Odor: Pool smell

Odor threshold: Not determined

pH values. 2.6 - 5

Change in condition: Melting point/melting range: 0C

Boiling point/boiling range: 100C

Flash point: Not applicable. Will not burn

Flammability (solid, gas): Not flammable

Upper/lower limits: Not applicable

Danger of explosion: Does not present and explosive hazard

Upper/lower limits: Not applicable

Relative density: 1 g/cm³

Solubility: Not applicable

Partition coefficient: Not applicable (insoluble in n-octanol)

Auto ignition temperature:

W

ill not auto ignite *Decomposition temperature:* Not determined

Viscosity: 1

c.p.

Section 10. Stability and Reactivity

Chemical stability Stable if used as intended

Thermal stability: Stable if used as intended

Hazardous reaction: Possibility of hazardous reaction with strong acids and strong alkali

Conditions to avoid No further information available *Materials to avoid* Strong acids and strong bases *Hazardous decomposition:* No further information available

Section 11. Toxicological Information

Toxicological: When used and handled according to instructions, the product does not have any harmful effects based upon our experience.

Sensitization: No sensitizing effects known

General EU Guidelines: Not subject to classification according to the calculation method of the General EU Classification Guidelines for Preparations as issued in the latest version.

NTP Not listed in the National Toxicological Program Report on Carcinogens, 2011

IARC Not listed

Section 12. Ecological Information

Toxicity: No known toxicity to plants or animals

Bioaccumulation: Does not bioaccumulate in animal or plants

Mobility in soil: Not mobile

Section 13. Disposal Consideration

Classification: Not a RCRA Hazardous Waste.

Disposal method: Small uncontaminated quantities can be disposed of with household waste. Dispose in accordance with federal, state (provincial), and local regulations.

Section 14. Transportation Information

UN Number:	DOT, ADR, ADN, IMDG, IATA:	Not Regulated
UN Proper Shipping Name:	DOT, ADR, ADN, IMDG, IATA:	Not Regulated
Transport Hazard Class:	DOT, ADR, ADN, IMDG, IATA:	Not Regulated
Packing Group:	DOT, ADR, IMDG, IATA:	Not Regulated
Marine pollutant:	No	
Proper shipping name:	Non-Hazardous for Transport	
Hazard Symbol:	None required	
Hazard Id Number (HIM):	None	

15. Regulatory Information

United States

SARA 355: Extremely hazardous substances: None of the ingredient listed

SARA 313: Specific toxic chemical listings: None of the ingredients listed

TSCA: All of the ingredient are listed

California Prop 65: Known to cause cancer: None of the ingredients listed Known to reproductive toxicity: None of the ingredients listed Known to cause developmental toxicity: None of the ingredients listed

Carcinogen categories: EPA None of the ingredients listed

IARC None of the ingredients listed

TLV by ACGHI None of the ingredients listed

NIOSH-Ca None of the ingredients listed

Canada: Domestic Substances List (DLS) All ingredients are listed

Ingredients Disclosure List (limit 0.1%) None of the ingredients listed Ingredients Disclosure List (limit 1%) None of the ingredients listed

REACH, Article 57: Substances of very high concern (SVHC) None of the ingredients listed

Chemical Safety Assessment: A Chemical Safety Assessment has not been carried out.

16. Other information

Safety Data Sheet:

Approved by: Alex Masters

Date: 2/4/2020

Abbreviations:

ACGIH American Conference of Governmental Industrial Hygienists

ADR European Agreement concerning the International Carriage of Dangerous Goods by Road

ADN European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways

CAS Chemical Abstracts Service (division of the American Chemical Society)

CLP Classification, Labeling, and Packaging Regulation (EC) No 1272/2008

DNEL Derived No-Effect Level (REACH)

DOT US Department of Transportation

DSL Domestic Substance List

ELINCS European List of Notified Chemical Substances

EPA Environmental Protection Agency

GHS Globally Harmonized System of Classification and Labelling of Chemicals

HMIS Hazardous Materials Identification System (USA)

IARC International Agency of Research on Cancer

IATA International Air Transport Association

IMDG International Maritime Code for Dangerous Goods

NIOSH National Institute of Occupational Safety and Health

NFPA National Fire Protection Association (USA)

NTP National Toxicological Program

PBT Persistent, Bioaccumulate, and Toxic

PNEC Predicted No-Effect Concentration (REACH)

REACH Registration, Evaluation, Authorization, and Restriction of Chemicals; (EC) 1907/2008

RCRA Resource Conservation and Recovery Act

SARA Superfund Amendment and Reauthorization Act

SVHC Substances of very high concern

TSCA Toxic Substances Control Act

TLV Threshold Limit Value

vPvB Very persistent and very bioaccumulative

WHMIS Workplace Hazardous Materials Information System (Canada)

The information on this Safety Data Sheet is believed to be accurate and is the best information available to OxiScience. This document is intended only as a guide to the appropriate precautions for handling. OxiScience makes no warranty of merchantability or any other warrant, expressed or implied with respect to the information or the product to which this Safety Sheet relates. Users and handlers of this product should make their own investigations to determine the suitability of the information provided herein for their own purpose.

https://www.p3shield.com/

Specification Sheet

Problem

Ongoing worldwide efforts at controlling environmental contamination with the most recent and dangerous emerging infectious agent (2019-nCov [now officially COVID-19])1 are undermined by the use of inadequate disinfection procedures. This is due to widespread dependence on conventional antimicrobial formulations that offer only short term protection of surfaces that become contaminated with corona viruses.

Solution

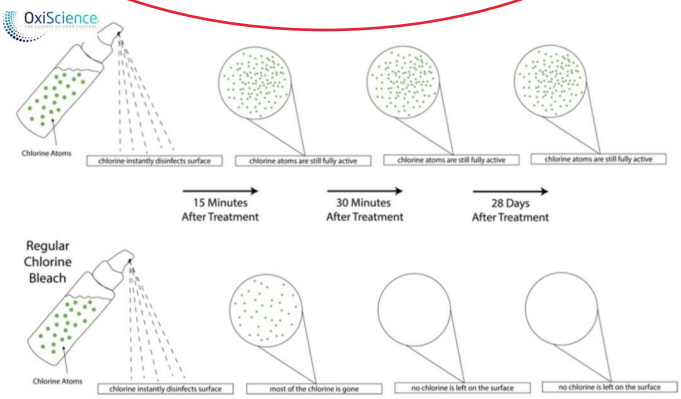
The OxiScience team developed these unique solutions (US Patent #10,028,482 [2018]) to take full advantage of the superior germ-killing effectiveness of chlorine (Cl) atoms. The technology does this by binding active Cl into biodegradable coatings that endure on disinfected surfaces.

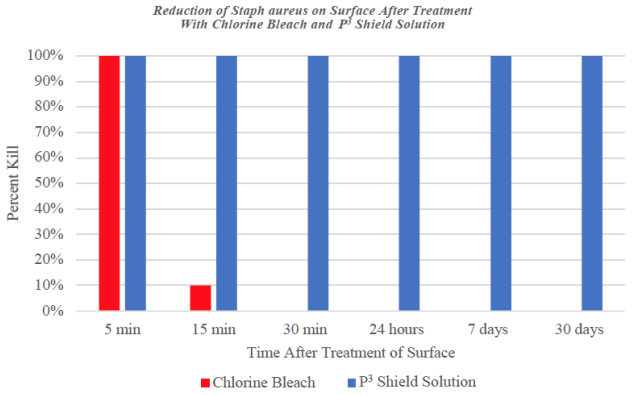
Evidence from previous coronavirus epidemics caused by human-adapted Cov variants (SARS, MERS) shows that infectious viral particles can persist on surfaces exposed to infected patients for up to 9 days.

Current disinfectants, of which the most powerful and popular is aqueous chlorine (Cl) as hypochlorite bleach, are known to be effective at inactivating coronaviruses rapidly, and to a high level in the laboratory. But once applied to targeted surfaces they disappear within minutes by evaporation (e.g., bleach, ethanol, isopropanol) or chemical degradation on exposure to air (e.g., chlorine dioxide). If excreted viruses in droplets land on OxiScience -treated surfaces that continue to display germ-killing amounts of Cl for weeks after a single application there is a high likelihood of virus inactivation to a useful degree in preventing contagion. Treated surfaces are safe to touch and it's easy to apply with traditional equipment and methods.

Scientific data collectively provide a solid basis for incorporating OxiScience persistent disinfectant protection into current infection control efforts not only for 2019 -nCov, but for all the germs, old or emerging, that continue to plague at-risk populations everywhere, both human and animal (e.g., influenza, COVID-19, ASF, norovirus).

The active ingredients in the MACS formulation are safe for prolonged skin contact, and do not cause irritation or sensitization. The major functional active is a registered US EPA biocidal compound. The polymeric agents used to enhance binding to fibers are US FDA-GRAS listed (Generally Regarded As Safe) and are safe enough to be incorporated into many consumer cosmetic and food products. An extensive review of the contact and environmental safety of the MACS active compound class is included in EPA Document-HQ-OPP-2013-0220-0008.





MEDETECH WHITE PAPER: February 12, 2020

Persistent high level protection of environmental surfaces against germ contamination: Medecide™, an innovation in disinfection technology to combat the spread of pandemic infections

Ongoing worldwide efforts at controlling environmental contamination with the most recent and dangerous emerging infectious agent (2019-nCov [now officially COVID-19])[1] are undermined by the use of inadequate disinfection procedures. This is due to widespread dependence on conventional antimicrobial formulations that offer only short term protection of surfaces that become contaminated with corona viruses. There is an urgent need to improve surface protection measures by adopting use of newly available formulations that, for the first time, deposit long-lasting and powerful antimicrobial activity on treated surfaces, both hard and soft. Medetech Corporation developed these unique solutions (US Patent *#10,028,482 [2018])* to take full advantage of the superior germ-killing effectiveness of chlorine (Cl) atoms. The technology does this by binding active Cl into biodegradable coatings that endure on disinfected surfaces. Compelling evidence from rigorous experiments described in the Supplemental Information (Below, pages 3-9) makes a strong case for the practicality and persistent efficacy of Medetech-treated surfaces. The formulations (Medecide™) add a new and unprecedented means of attack on the environmental spread of infectious diseases for the 21st Century.

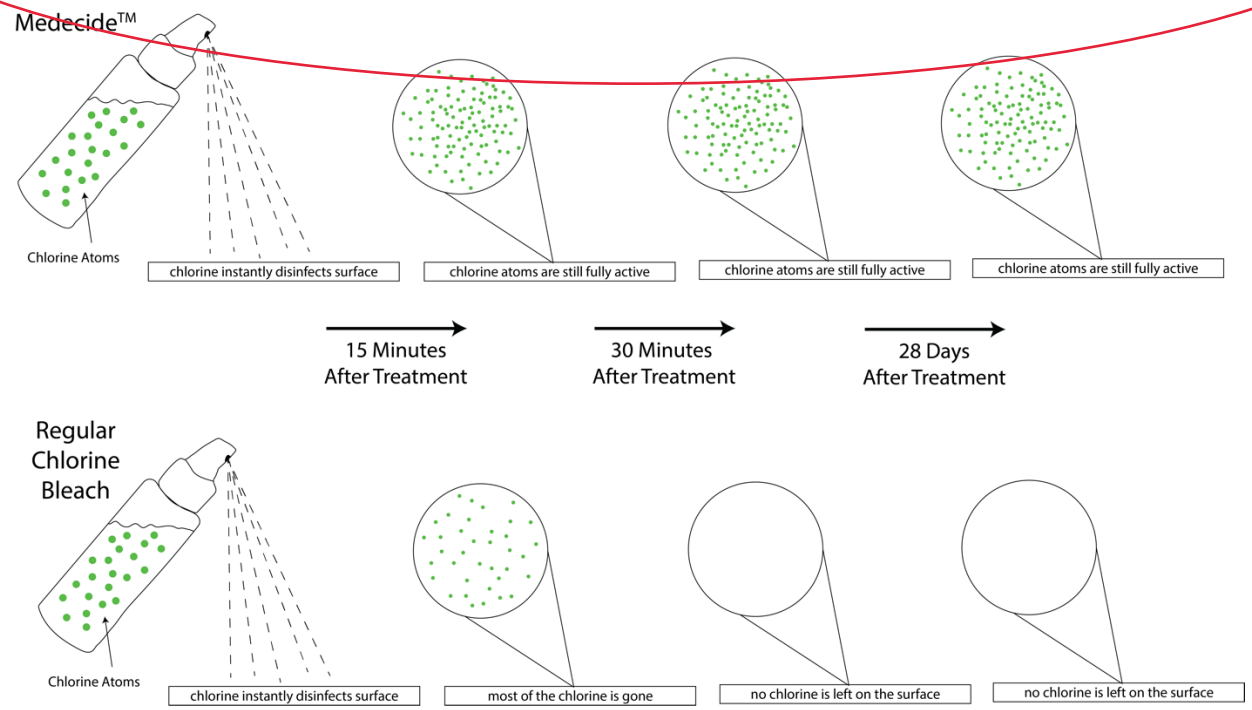
Evidence from previous coronavirus epidemics caused by human-adapted Cov variants (SARS, MERS) shows that infectious viral particles can persist on surfaces exposed to infected patients for up to 9 days[2, 3, 4]. Survival for 4-5 days is common[2]. There is every reason to expect 2019-nCov Wuhan to be at least equally persistent[2]. Current disinfectants, of which the most powerful and popular is aqueous chlorine (Cl) as hypochlorite bleach, are known to be effective at inactivating coronaviruses rapidly, and to a high level in the laboratory[2,5]. But once applied to targeted surfaces they disappear within minutes by evaporation (e.g., bleach, ethanol, isopropanol) or chemical degradation on exposure to air (e.g., chlorine dioxide).

The 2019-nCov variant is extremely contagious[1], and infectious viruses in expired air and other bodily excretions of patients[6] will ensure rapid repopulation of environmental surfaces, where they will normally endure. Transmission by touching deposits of the virus and transferring these to the face is one of the most common means of acquiring infection[7,8]. If excreted viruses in droplets land on Medecide™ -treated surfaces that continue to display germ-killing amounts of Cl for weeks after a single application there is a high likelihood of virus inactivation to a useful degree in preventing contagion.

Data from experiments involving challenge of treated surfaces with infectious germs of all kinds---bacteria, viruses, yeasts, fungi, spores---up to two months after one disinfecting treatment demonstrate that levels of kill are maintained at a high level across the board (Supplemental Information). Treated surfaces are safe to touch, and Medecide™ formulations are water-based,

and easy to apply with traditional equipment and methods. The principal active component in the formulation is an EPA-registered biocidal agent.

Many factors will influence the duration and extent of the killing efficacy in the real world, including temperature, humidity, organic deposits (such as sputum, saliva, feces), sunlight exposure, etc. **But these scientific data collectively provide a solid basis for incorporating Medecide™ persistent disinfectant protection into current infection control efforts not only for 2019 -nCov, but for all the germs, old or emerging, that continue to plague at-risk populations everywhere, both human and animal (e.g., influenza, COVID-19, ASF, norovirus).**



References:

1. World Health Organization. Novel Coronavirus (2019-nCov). Situation report. WHO 2020.
2. Kampf, G et al., Persistence of coronaviruses on inanimate surfaces and its inactivatoin with biocidal agents. J Hospital Infection (2020), DOI:10.1016/j.jhin.2020.01.22
3. Van Doremalen, N et *al*., Stability of MERS-CoV under different environmental conditions. Euro.Surveillance (2013), 18.
4. Casanova, LM, et *al.*, Effects of air temperature and relative humidity on coronal virus survival on surfaces. (2010), 76, 2712.
5. Rabenau, HF, et *al*. Efficacy of various disinfectants against SARS coronavirus. J.Hospital Infection (2005), 61, 107.
6. https://www.scmp.com/news/china/politics/article/3048611/coronavirus-scientists-identify-possible-new-mode-transmission
7. Kwok, YL, et *al*., Face touching: a frequent habit that has implications for hand hygiene. Amer. J Infection Control (2015), 43, 112
8. Warnes, SL et *al*., Human coronavirus 229E remains infectious on common touch surface materials. mBIO (2015),6, e01697

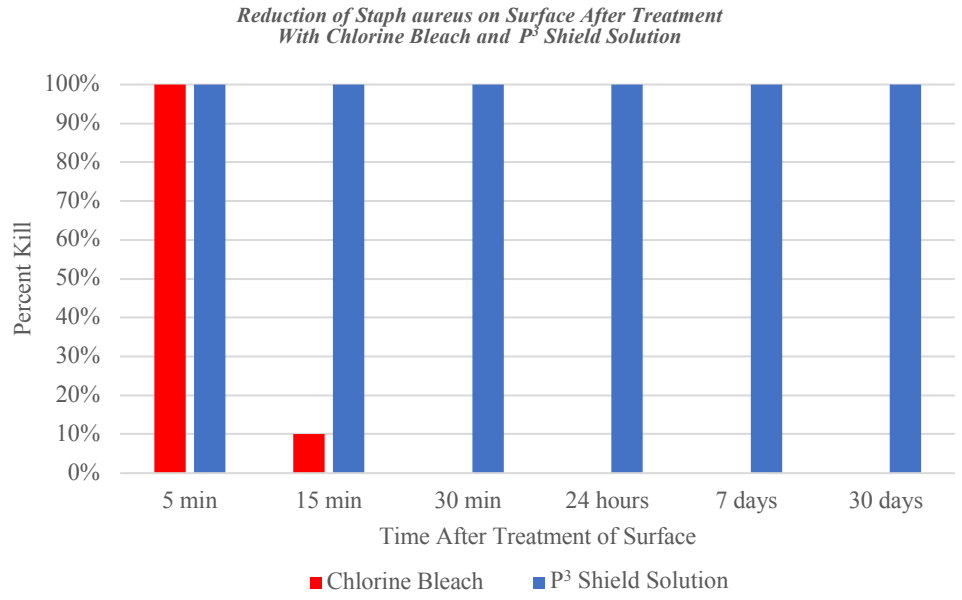
Persistence of the Medecide™ antimicrobial coating on a hard surface substrate.

Authors: Jennifer Cadnum, MS and Curtis Donskey, MD*
Department of Medicine, Veterans Administration Hospital and Case Western University Medical School, Cleveland, Ohio

The purpose of this study was to establish the antimicrobial efficacy and the persistence of efficacy of Medecide™-treated solid surfaces in comparison to the industry gold standard of 10% sodium hypochlorite (chlorine bleach @ 6000 ppm).

Medecide™ formulation and Cl bleach solutions were sprayed onto Formica solid surface areas and allowed to air dry. At intervals after the coatings were dry suspensions of Multiple Antibiotic Resistant *Staph aureus* (MRSA) bacteria were applied as challenge inocula. Untreated Formica was similarly challenged so as to measure the recovery of MRSA bacteria that could be expected from a normal (unmodified) Formica surface. After contact for 30 minutes the degree of killing of the microbes was measured by recovering them from test surfaces and comparing the recovered bacteria colonies to the numbers recovered from control (uncoated) surfaces and from surfaces exposed to chlorine bleach.

Medecide™ treatment of Formica surfaces provided high levels of germ kill not only at the earliest challenge time points, but also at all the other challenge time points through the following 28 days (the longest time tested in the study) (See figure below). Surfaces treated with 10% hypochlorite bleach showed high efficacy at the earliest time points of challenge, but the effectiveness then rapidly declined so that by 30 minutes post-drying it had disappeared completely. The stabilization of the active Cl atoms in the Medecide™ clearly allowed for high-level persistence of efficacy on the coated surfaces for 30 days or more without noticeable decline.



*Dr. Donskey is a recognized authority on coronaviruses (e,g, Otter, JA, **Donskey, C**, Yezli,S, Douthwaite, S, Goldenberg, SD and Weber, DJ: Transmission of SARS and MERS Coronaviruses and influenza virus in healthcare settings; the possible role of dry surface contamination. J..Hospital Infection Control, 2016, vol 92, 235-250

Antimicrobial properties of nonwoven textiles treated with Medecide™ formulations.

Author: Jose Santiago, MS (Microbiology), Director
Pacific NorthWest Microbiology Services, Bellevue, WA

The purpose of this experiment was to measure the antimicrobial efficacy of nonwoven fabric samples that had been treated with different amounts of Medecide™ solution, dried, and shown to contain a range of active chlorine concentrations.

Antibacterial tests were conducted according to a modification of AATCC Test Method 100-1999. All tests were performed in a Biosafety Level 2 hood. In this study, *Staphylococcus aureus* (*S. aureus*, ATCC 6538) and *Escherichia coli* (*E. coli*, ATCC 15597) were used as typical examples of Gram-positive and Gram-negative bacteria, respectively. *Candida albicans* (*C. albicans* 10231) was employed to challenge the antifungal activities of the samples. *E. coli* bacteriophage MS2 strain 15597-B1 virus was used to represent viral species. *Bacillus subtilis* spores obtained from North American Science Associates (Northwood, Ohio; lot no. N24609) were used to challenge the sporicidal properties of the treated fabrics.

All the coated fabrics had chlorine contents that showed potent biocidal efficacy against a wide range of microorganisms. Shown in Table 1 are results for Gram-negative bacteria, Gram-positive bacteria, fungi, viruses and sporse. Higher active chlorine contents in the finished textile samples led to more potent biocidal efficacies. At 4960 ppm chlorine content, the treated fabrics provided a total kill of 10^8–10^9 CFU/mL for *S. aureus*, *E. coli*, and *C. albicans* in only 3 min or less. MS2 virus appeared to be more resistant than the bacterial and fungal species tested: at the same chlorine content, it took 10 min for the fabrics to offer a total kill of 10^6–10^7 PFU/mL for the virus.

Table 1. Antibacterial activities of treated fabrics with various active chlorine contents resulting from an aqueous finishing bath exposure to Medecide™

Active chlorine content	Minimum contact time for a total kill (min)				
(ppm)	*S. aureus*	*E. coli*	*C. albicans*	*MS2 virus*	*Spore*
558	30	30	60	120	N/A
1080	15	15	30	60	480
2952	2	2	5	15	120
4960	1	1	3	10	10

Antimicrobial properties of hard surface (Formica) coupons treated with Medecide™ formulations.

Author: Jose Santiago, MS (Microbiology), Director
Pacific NorthWest Microbiology Services, Bellevue, WA

The purpose of these tests was to determine the antimicrobial efficacy and surface persistence of active chlorine resulting from treatment of hard surface coupons (Formica) with two different Medecide™ formulations applied as a spray. Formica swatch samples were procured from Home Depot. Formica coupons were used with either smooth or textured surfaces. Coupons were sprayed and air dried at room temperature, and then stored for 15min, 24h, 7 days and 2 months under normal laboratory conditions in the dark, before being challenged with microbial suspensions to determine efficacy. The antimicrobial testing was performed according to a modified Japanese Standards Association protocol, ISO 22196:2007/JIS Z 2801:2000 titled "Antimicrobial products- Test for antimicrobial activity and efficacy."

Procedure: Each test piece was cut into squares 50mm ± 2mm each side. They were sterilized with dry heat to minimize warping by wrapping in aluminum foil and placing them in an oven at 180°C for 30 minutes. Test coupons were then sprayed with one of the Medecide™ solutions and allowed to air dry. Unsprayed samples served as controls. Some coupons were wiped with a sterile cloth after air drying to see if the coating was readily removed or not.

Test Inoculum Preparation: One day prior to testing, a *Staphylococcus aureus* overnight culture was prepared by using a sterile 4mm inoculating loop to transfer one loop-full of bacteria from a TSA plate onto a Nutrient Agar (NA) slant. After overnight culture at 34-36°C, a loop-full of bacteria was transferred into 10 mL of 1:500 nutrient broth by dragging a sterile 4mm inoculating loop in a straight line up the length of the slant. If it was necessary, 1:500 Nutrient Broth (NB) was used to arrive at a final challenge concentration of 6×10^5 cfu/100µL.

Antimicrobial Testing Procedure: Parafilm film was cut into squares with 40mm ± 2mm each side. Prior to testing, each piece of parafilm was cleaned with ethanol and allowed to air-dry. Aseptically the carrier test pieces were transferred into sterile petri-plates. Each test piece was inoculated with 100µL of the challenge inoculum. Test coupons were covered with a piece of clean parafilm and gently pressed so that the challenge inoculum spread over the parafilm area making sure that inoculum did not spill over the edge. Petri-plates were allowed to sit in the bio-safety cabinet at room temperature for 30 minutes. After a 30 minute contact time had elapsed, sterile tweezers were used to carefully transfer each of the treated and untreated test pieces into individual sterile Whirl-Paks containing 10 mL of SCDLP broth.

Test coupons were massaged in neutralizing solution for at least thirty seconds. 10-fold serial dilutions of the SCDLP broth in DPBS were prepared. The SCDLP broth and dilutions were placed onto Plate Count Agar (PCA) using the spread-plate method. Plates were incubated at 34-36°C for 48 hours. After the incubation period, the plates were used to establish colony plate counts so as to calculate the corresponding Log Reduction values (LRV).

Results: As shown in Table 2, the coated Formica surfaces showed persistence of high levels of antimicrobial efficacy even after two months. At two months, the coupon surfaces, both smooth and textured provided more than 3 LRV and in some cases up to >7 LRV of challenge test organisms. Wiping air dried coupons did not readily remove the antimicrobial coating.

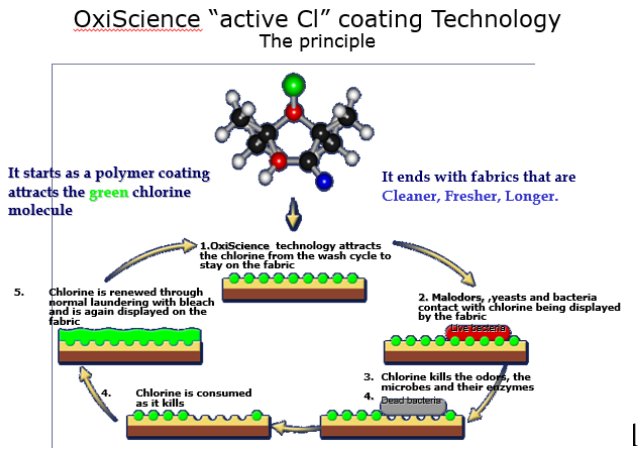
Table 2, Antimicrobial efficacy and persistence on Formica coupons coated with Medecide™ formulations and challenged with *S. aureus*

Sample Description Disinfecting fluid	**Post**	**Dry**	**Substrate**	**CFU/100µL**	**LRV**
#1	15 min	air dried	Textured, black	2.00E+00	7.17
#1	15 min	Wiped	Smooth, white	1.00E+00	7.48
#2	15 min	Air-dry	Textured, black	1.00E+00	7.48
#2	15 min	Air-dry	Smooth, white	8.40E+01	5.55
#2	15 min	Wiped	Textured, black	0.00E+00	7.48
# 1	24 h	Air-dry	Textured, black	1.50E+01	6.3
#1	24 h	Air-dry	Smooth, white	1.00E+00	7.48
#2	24 h	Air-dry	Textured, black	4.00E+00	6.88
#2	24 h	Air-dry	Smooth, white	5.00E+00	6.78
#1	7 d	Air-dry	Smooth, white	1.35E+02	5.55
#2	2 m	Air-dry	Smooth, tan	1.20E+04	3.34
#2	2 m	Wiped	Textured, tan	6.00E+00	6.64
Unsprayed Control		Air-dry	Textured, black	3.40E+08	-
Unsprayed Control		Air-dry	Smooth, tan	3.50E+08	-
Sterility Control			Textured, black	0.00E+00	-

OxiScience Product Sheet: Durable, rechargeable textile fiber coating technology for antimicrobial and odor control applications

Introduction: OxiScience LLC scientists have developed unique, patented water-based formulations of Cl-binding heterocyclic compounds for use on soft surfaces (US patents #10,028,482, US#10, 131,731, 2018*, and coinventor status on US Patent # 9, 700, 040). Certain formulations integrate oxidative N-halamine structures into novel permanent cross-linked polymers. These coatings not only confer potent antimicrobial and odor control properties on textiles, but are durable enough to allow for routine, laundry-based refreshing of these functions. The result is an unprecedented display on commonplace textiles of the ability to rapidly kill germs of all kinds that come into contact with the oxidatively charged surfaces, whether woven, nonwoven or knitted.

The Technology: Suitable textile compositions can include cotton and rayon goods, and blends with synthetic fiber components. The coating process is compatible with currently applied range technology for woven and nonwoven textile production, and for batch treatment of knitted goods. It requires conventional dip/nip/cure processes, allowing for wet bath exposures followed by a mild high temperature cure before the products can be charged with oxidative Cl. Therafter the coatings will remain on the fibers for the rest of the life of the textile, and can be recharged >50 times. Active chlorine charging of the coating can be accomplished through in-plant final rinsing, and then by repeated user-based



laundering (See figure 1).

The fully charged coating accomplishes the following:

- **It kills bacteria, viruses, and yeasts on contact, quickly, powerfully, safely, in a way that poses no hazard at all to skin and mucous membranes.**
- **It attacks and degrades a wide range of malodor compounds, including sulfur-containing microbial waste products. The film does not just fix or bind odors, it destroys these molecular constructs, and reduces them to chemical rubble. Rubble that has no smell.**

- **It stops the enzymes released by bacteria and yeasts from digesting nutrients in human sweat, sebum, sloughed-skin cells, mucus, etc., so that they cannot generate bad-smelling waste products**.

The rechargeable OxiScience coatings have no downside effects on the look and feel of knit or woven fabrics, natural or synthetic fibers or blends, or on their wear-life duration, or physical attributes (fiber tensile strength, etc.). The active Cl recharge process is achievable with routine laundry exposure, and once in place this bound chlorine has no objectionable smell. Fully charged textile swatches have been thoroughly tested for safety using the standard EPA-required, third party contracted, animal exposure protocols, including for sensitization.

The principals of OxiScience have been involved in this area of textile chemistry for 20+ years, and brought one early version to market in the US (HaloShield, co-branded with Clorox Co.) specifically targeted to odor control. There are now several new generation polymer coatings available and controlled by OxiScience IP or acquired by exclusive licensed right. The company's executives have published extensively in the peer-reviwed scientific literature in this technology field. Each of the **OxiScience coatings provides for very rapid rates of kill of all germ types on contact , usually to the extent of 99.9 to 99.9999% of challenge microbes, within minutes or sometimes even seconds, depending on the organisms involved.**

The Opportunity:

While anecdotal accounts of experiences with Cl-coated garments in use indicate significant benefits arising in the resolution of skin conditions, like Athlete's foot, and acne, the major opportunity lies in the area of **infection control**. Recent years have seen the accumulation of compelling evidence that healthcare textiles contaminated with **germs, on garments of personnel, on bed linens, curtains,** can be responsible for serious outbreaks of infectious disease. Long suspected but only more recently proven, these episodes of disease spread are the result of persistent survival of all kinds of microbes on textile surfaces.

Persistence of many causes of hospital acquired infections on conventional textile surfaces is now known to be more common and last much longer than anyone suspected. Integration of antimicrobial properties has been attempted with a variety of chemistries but **none shows the power, speed and durability of OxiScience coatings**. The poor performance of current market offerings leaves a significant opportunity available for effective innovation in the healthcare sector, and one that promises to make serious impact on contemporary infection control measures. **Contributing to these potential improvements in overall institutional infection control with a cost-effective, scalable, readily implemented novel technology with proven credentials, is a worthy goal, and one that merits widespread adoption of the company's innovations.**

Additional advantages of the technology, resulting from its powerful odor control effects, can also be applied in this sector, particularly in the management of incontinence.

Wet bath treatment of nonwoven textile substrate as a means of establishing high level active Cl coatings using Medecide™.

Author: Jose Santiago, MS (Microbiology), Director
Pacific NorthWest Microbiology Services, Bellevue, WA

The purpose of these experiments was to measure the amount of active chlorine that could be bound to nonwoven textile swatches by using iodometric titration of the oxidative Cl content.

Nonwoven polypropylene textile samples prepared by wet bath exposure at room temperature to Medecide™ were tested after air drying to measure the active chlorine contents by iodometric titration as an indicator of the successful application of the coating. Coated fabric swatches 0.5~1 g of were cut into fine fragments, and treated with a solution of one g of KI in 100 mL of deionized water (the solution contained 0.05% (v/v) of TX-100) at room temperature under constant stirring for 1 hour. The amount of Iodine (I_2) formed was titrated with standardized sodium thiosulfate aqueous solution. The uncoated fabrics were tested under the same conditions to serve as controls. The available active chlorine content on the fabrics was calculated according to equation (1):

$$Cl\% = \frac{35.5}{2} \times \frac{(V_S - V_0) \times C_{Na_2S_2O_3}}{W_S} \times 100 \qquad (1)$$

where V_S, V_0, $C_{Na2S2O3}$ and W_S were the volumes (mL) of sodium thiosulfate solutions consumed in the titration of the coated and uncoated samples, the concentration (mol/L) of the standardized sodium thiosulfate solution, and the weight of the chlorinated sample (mg), respectively.

By adjusting the Medecide™ concentrations used the wet bath, a series of polypropylene fabric swatches was obtained with active chlorine contents of 558, 1080, 2952 and 4960 ppm, respectively. The results demonstrated the acquisition of sufficient chlorine to confer high level antimicrobial functionality on the fabrics by use of a finishing method (wet bath/nip/air dry) common to the industry.