

NoroxyCdiff™

Daily Disinfectant Cleaner

Cleaner • Disinfectant • Food Contact Surface
Sanitizer • Virucide*



*Effective in 2 Minutes Against
Clostridium difficile spores.*

*Kills Norovirus**

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Noroxycdiff

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Outstanding disinfectant properties

NOROxyCdiff has outstanding disinfectant properties. It is effective against bacteria, molds and virus. The reason for the excellent and rapid antimicrobial effects of NOROxyCdiff is the specific capability to penetrate through the cell membrane. In the cell, the peracetic and acetic acid irreversibly disrupts the enzyme system, which in turn leads to destruction of the microorganism. NOROxyCdiff has shown disinfectant properties in relevant efficacy tests.



EPA Registration
#10324-214-92089

Noroxycdiff

Daily Disinfectant Cleaner



Noroxycdiff at Work



Combat *C. diff* and HAIs with Noroxycdiff Sporicidal Disinfectant Cleaner

Kill Time

With its shorter kill times, Noroxycdiff Sporicidal Disinfectant Cleaner stays wet and works faster. The outcome – assured efficacy against hard-to-kill *C. difficile* spores and other dangerous pathogens every time you clean and disinfect.

Cost-Effective

The non-bleach, hydrogen peroxide/ peroxyacetic acid based formulation leaves no harmful or corrosive residues, no undesirable film on surfaces. Noroxycdiff Sporicidal Disinfectant is compatible with many different surfaces and medical equipment used in healthcare including stainless steel, aluminum, chrome, glazed ceramic tile, plastic and painted surfaces, and finished floors. Unlike bleach-based products, it will not corrode metal or damage mattress covers, and requires no rinsing. See the Technical Guide for a broad list of compatible surfaces.

Noroxycdiff Concentrate

Simply pour the NOROxyCdiff from the 4oz. container into one gallon of water. Be sure to read all NOROxyCdiff directions on master label thoroughly prior to use. NOROxyCdiff can be applied as a liquid using standard touchless cleaning protocols or via trigger spray bottle; and wiping with absorbent towels for cleaning clinical surfaces.

Efficacy Data

| Sporicidal | Oz. / Gallon | Contact Time |
|---|---------------------|---------------------|
| Clostridium difficile | 4 | 2 |
| <hr/> | | |
| Bacteria | Oz. / Gallon | Contact Time |
| Acinetobacter baumannii (ATCC 19606) | 4 | 2 |
| Bordetella pertussis (ATCC 12743) | 4 | 2 |
| Community Acquired Methicillin Resistant Staphylococcus aureus CA-MRSA 300 NRS-384 | 4 | 2 |
| Community Acquired Methicillin Resistant Staphylococcus aureus CA-MRSA 400 NRS 123 | 4 | 2 |
| Escherichia coli (ATCC 11229) | 4 | 2 |
| Escherichia coli with beta-lactamase resistance (ESBL) BAA-196 | 4 | 2 |
| Klebsiella pneumonia (ATCC 4352) | 4 | 2 |
| Klebsiella pneumonia Carbapenem Resistant BAA-1705 | 4 | 2 |
| Methicillin Resistant Staphylococcus aureus MRSA (ATCC 33592) | 4 | 2 |
| Proteus mirabilis (ATCC 9240) | 4 | 2 |
| Pseudomonas aeruginosa (ATCC 15442) | 4 | 2 |
| Salmonella enterica (ATCC 10708) | 4 | 2 |
| Staphylococcus aureus (ATCC 6538) | 4 | 2 |
| Streptococcus pneumonia (ATCC 6305) | 4 | 2 |
| Streptococcus pyogenes (ATCC 19615) | 4 | 2 |
| Vancomycin Intermediate Resistant Staphylococcus aureus VISA HIP 5836 | 4 | 2 |
| Vancomycin Resistant Enterococcus faecalis VRE (ATCC 51575) | 4 | 2 |
| <hr/> | | |
| Virucidal | Oz. / Gallon | Contact Time |
| Adenovirus type 5 (ATCC VR-5) Strain Adenoid 75 | 4 | 2 |
| Herpes simplex virus type 1 (ATCC VR-733) | 4 | 2 |
| Herpes simplex virus type 2 (ATCC VR-734) | 4 | 2 |
| Human Immunodeficiency virus type 1 HTLV-IIIB | 4 | 2 |
| Influenza A virus (ATCC VR-544) | 4 | 2 |
| Murine Norovirus (MNV-1) | 4 | 2 |
| Norovirus (ATCC VR-782) | 4 | 2 |
| Respiratory syncytial (RSV) virus (ATCC VR-26) | 4 | 2 |
| Rhinovirus type 37 (ATCC VR-1147) | 4 | 2 |
| Rotavirus | 4 | 2 |
| Vaccinia virus (ATCC VR-119) | 4 | 2 |
| Canine Parvovirus (CPV) | 4 | 5 |
| Hepatitis B Virus | 4 | 5 |
| Hepatitis C Virus (ATCC VR-1422) | 4 | 5 |
| <hr/> | | |
| Fungicidal | Oz. / Gallon | Contact Time |
| Candida albicans (ATCC 10231) | 4 | 2 |
| Trichophyton mentagrophytes (ATCC 9533) (Athlete's foot fungus) (a cause of Ringworm) | 4 | 2 |

Corrosion Essay

NoroxyCdiff readily decomposes and its primary and secondary products are all deemed non-harmful to the environment. NoroxyCdiff PAA-based sanitizers are environmentally friendly as the compounds therein break down into acetic acid, oxygen, and water. These sanitizers are also less corrosive to equipment than hypochlorites.

Corrosive Effects of NOROXYCDIFF at USE Dilution

Experimental Methods:

Corrosion coupons of the various metals were suspended in the various concentrations of NOROXYCDIFF PAA for 30 days. A solution was prepared in the laboratory at 250 ppm hardness to which each indicated amount of NOROXYCDIFF PAA was added. The NOROXYCDIFF PAA solution was kept at 70° F throughout the test and changed every other day for 30 days. At the end of the test, each coupon was rinsed and cleaned in accordance with ASTM procedures and reweighed.

The Corrosion rates were then calculated and expressed in mpy (Mils Per Year) which is thousandths of an inch per year. 1 mpy is equivalent to 0.0010 inches per year. General industry standards are: <5 mpy is very good; 5.1-10 mpy is acceptable/marginal, and >10 mpy is corrosive in relative degrees.

Results:

All corrosion rates are presented in MPY (mils per year).

Corrosion Rate (mpy)

| <u>Metal</u> | <u>100 ppm</u> | <u>200 ppm</u> | <u>400 ppm</u> |
|-----------------------|----------------|----------------|----------------|
| • Aluminum 99.5% | 0 mpy | 0 mpy | 0 mpy |
| • Stainless Steel 304 | 0 | 0 | 0 |
| • Stainless Steel 316 | 0 | 0 | 0 |
| • Tinned Iron | 0 | 0 | 0 |
| • Glass | 0 | 0 | 0 |
| • Plastics | 0 | 0 | 0 |

Category: *Disinfectants*

| | |
|---|------|
| 11.3.1 Sandwich Corrosion | PASS |
| 11.3.2 Immersion Corrosion Test | PASS |
| 11.3.3 Rubber Test | PASS |
| 11.3.4 Sealant Test | PASS |
| 11.3.5 Painted Surface Test | PASS |
| 11.3.6 Tedlar Surface Test | PASS |
| 11.3.7 Vinyl Surface Test | PASS |
| 11.3.8 Fabric and Carpet Test | PASS |
| 11.3.9 Leather & Naugahyde Test | PASS |
| 11.3.10 Flash Point Test | PASS |
| 11.3.11 Polycarbonate Crazing Test (Lexan 9600 & BMS8-400) | PASS |

Conclusions: Non-corrosive for Aluminum, Glass, Plastics, Stainless and non-staining

Why Noroxycdiff ?

For over 100 years, Bleach has been the standard go-to chemical to combat the control and spread of dangerous "spore level" pathogens in the healthcare environment.

The most recent "Guideline for Disinfection & Sterilization in Healthcare Facilities" available on the CDC website was published in November, 2008, and was prepared under the direction of William A. Rutala, Ph.D., M.P.H., David J. Weber, M.D., M.P.H. & numerous members of the Healthcare Infection Control Practices Advisory Committee (HICPAC).

Of note, both Rutala & Weber are affiliated with the University of North Carolina Health Care System and the University of North Carolina School of Medicine in Chapel Hill, North Carolina.

The Guideline is comprehensive and covers many different topics among its 158 pages. A link to the entire document is provided below:

https://www.cdc.gov/hicpac/pdf/guidelines/Disinfection_Nov_2008.pdf

For purposes of this discussion, we are going to focus exclusively on Surface Disinfection. Is Surface Disinfection Necessary? The section of the "Guideline" addressing this topic begins on Page 29.

Even more specifically, we are going to focus our discussion on "Spore-Level" pathogens that are known to thrive on healthcare surfaces for greater than 5 months, with the most commonly known; Clostridium Difficile. C.diff, for short. MRSA has been found on surfaces for greater than 12 months.

Dating back to as early as 1939, Earle H. Spaulding of Temple University in Philadelphia, PA proposed a strategy for the classification for sterilization or disinfection of inanimate objects and surfaces based upon the degree of risk involved in their use.

The Spaulding Classification Model became widely used throughout the World beginning in 1957. Spaulding's Microbiological Disinfectant Hierarchy lists pathogens from the Most Resistant to chemical disinfection to the Most Susceptible; in other words, hardest to kill to easiest to kill.

| | |
|-------------------------|--|
| MOST RESISTANT | Spores (<i>C.diff</i>) |
| | Mycobacteria (<i>M. tuberculosis</i>) |
| | Non-Enveloped Viruses (<i>No virus, HAV, Polio</i>) |
| | Fungi (<i>Candida, Trichophyton</i>) |
| | Bacteria (<i>MRSA, VRE, Acinetobacter</i>) |
| MOST SUSCEPTIBLE | Enveloped Viruses (<i>HIV, HSV, Flu, Ebola</i>) |

Why is this important to understand? Because it has led to the belief that the more resistant the pathogen to disinfection, the more toxic and dangerous the chemical must be in order to kill.

Even more important to know is that as of January 27, 2017, there are only a total of 50 products registered with the EPA that are effective against C.diff spores vs. 100's effective against lower level pathogens. Of these fifty registered sporicides, 42 are some form of Bleach/Chlorine, with many of these just being a different version or configurations of the same chemical.

The remaining eight products registered are either PAA (Peracetic Acid) Liquid or Hydrogen Peroxide Fogging devices. NOROxyCdiff fits into this category.

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In June 2014, Strategies to Prevent Clostridium difficile Infections in Acute Care Hospitals was published in Infection Control and Hospital Epidemiology, as an update to their previously published recommendations in 2008.

http://digitalcommons.wustl.edu/cgi/viewcontent.cgi?article=3925&context=open_access_pubs

What changed between the 2008 publishing and the 2014 publishing? Not much, other than the C.diff problem has continued to grow. The report continues to talk about better hand washing compliance, better antibiotic stewardship, etc., but limited new information about the role environmental surfaces play in "preventing" infections. Most reports talk about "control". There is a cursory mention of a few of the new "touchless" technologies that have been introduced since 2008; UV and Hydrogen Peroxide Fogging, but for the most part, the writers are dismissive of the new technologies. I'll be discussing my thoughts on these touchless technologies later on in this report.

Why do the "experts" continue to promote the use of bleach? Is it because, in their opinion, there are no other options? If bleach works so well, why does the problem continue to grow? Is it because, while bleach works in the Lab, it doesn't work so well in the real-world environment? Are our Environmental Services Technicians not using bleach properly? Are dilution ratios being manipulated to make the in-use product more palatable to use? Are "Contact" times being achieved? Are we cleaning the surface prior to disinfecting, as the EPA Registrations require? Are we wiping down the surfaces with a clean damp cloth after the Contact time to minimize the corrosive effect of bleach? Are we limiting the use of bleach to just the "control" of C.diff rather than the "prevention" of, because of bleach's corrosive and damaging properties? Or, are we just using bleach because that's what the "experts" say we should use?

One such noted expert, William Rutala, while being a long-term proponent of bleach, did make some interesting suggestions in 2015, when he talked about Expanding the Use of the Disinfection Hierarchy (the Spaulding Classification discussed above) to include what is termed Vertical-Applied Down, meaning if a product is capable of killing a spore-level pathogen, it would most certainly kill a lower-level pathogen.

https://www.epa.gov/sites/production/files/2015-10/documents/rutala_overview_of_current_disinfection_hierarchy_models_final.pdf

So if there was a spore-level disinfectant with a very good in-use safety profile, had a Contact Time of 2-Minutes, could be used on most surfaces in a healthcare environment without the threat of damage or corrosion, could be used with a patient in the room, could be used as a single product to kill all pathogens and eliminate the confusion of what product do I use to kill pathogens that are invisible to the eye, could be applied with cloths, disposable wipes, brushes, mops, trigger and mechanical spray devices, and was packaged in such a way that the pungent odor normally associated with PAA chemicals is minimized, and when combined with the XCEL Disposable MicroFiber Wipers could provide an application solution at a cost averaging \$1.69 per Daily Room Cleaning, would that be worthy of further consideration by the "experts"?

The disinfectant exists today, and it's called NOROxyCdiff!

NOROxyCdiff is the only spore-level disinfectant with a C.diff spore Contact time of 2-minutes, an in-use HMIS Safety Rating of 0-0-0, that requires no in-use PPE to apply, is non-corrosive to most surfaces typically found in a healthcare environment, can be applied electrostatically to reach all of the nooks and crannies where dangerous pathogens can hide, and requires no rinse or wiping after application.

Select comparisons from List "K": EPA Registered Antimicrobial Products Effective Against Clostridium difficile Spores.
 Information compiled from Product SDS & EPA Master Registrations
<https://www.epa.gov/sites/production/files/2017-01/documents/20172701.listk.pdf>

| Product Name | NOROCyCdiff In-Use | Clorex Germicidal Bleach In-Use | Clorex Germicidal Bleach Wipes | Clorex Fuzion Cleaner Disinfectant Spray | OxyCide In-Use | ViraSept | PDISani Cloth Bleach Wipes | Dispatch Cleaner Disinfectant Towels w/ Bleach | Klorsept In-Use | Peridox RIU |
|-----------------------------------|----------------------------------|---|--------------------------------|---|-----------------------------------|------------------------------------|----------------------------|--|--|--|
| EPA Registration Number | 10324-214-92089 | 5813-102 | 67619-12 | 67619-30 | 1677-237 | 1677-226 | 9480-8 | 56392-8 | 71847-6 | 88089-4 |
| C.diff Spore Contact Time | 3-Minutes | 5-Minutes | 3-Minutes | 2-Minutes | 3-Minutes | 10-Minutes | 4-Minutes | 3-Minutes | 4-Minutes 4306ppm | 3-Minutes |
| HMS Safety Rating | 0-0-0 | 1-0-1 | 1-0-1 | 0-0-0 | 1-0-0 | 3-0-0 | 1-1-0 | 1-0-1 | Not specified in SDS | 2-0-0 |
| Active Ingredients | Hydrogen Peroxide, PAA | Sodium Hypochlorite 8.3% 1:9 Solution 8700ppm | Sodium Hypochlorite .55% | Sodium Hypochlorite .39% | Hydrogen Peroxide, PAA | Hydrogen Peroxide 3.13% PAA .050% | Sodium Hypochlorite .63% | Sodium Hypochlorite .65% | Chlorine | Hydrogen Peroxide, PAA |
| PPE Required? | No | Yes Level A | Yes Level A | No | No. Effective Exhaust Ventilation | Yes Safety Goggles w/ side shields | Yes. Gloves | Yes Level A | Yes. Gloves, Safety Glasses, Ventilation | Yes. Gloves, Safety Glasses, Ventilation |
| Corrosive? | NO. On most healthcare surfaces. | Yes | Yes | Yes | No. On most healthcare surfaces | No. On most healthcare surfaces | Yes | Yes | No. On most Healthcare surfaces | No. On most healthcare surfaces |
| Can be applied Electrostatically? | Yes | No | No. RIU Wipe Configuration | No. Only available in dual chamber trigger spray bottle | Not recommended | No | No. RIU Wipe Configuration | No. RIU Wipe Configuration | Not Recommended | Not Recommended |
| Rinse/Wipe Required? | No. Air Dry | Yes, after 5 minutes | Yes, after 3 minutes | Yes, after 2 minutes | No | No | Yes, after 4 minutes | Yes, after 3 minutes | Yes, to remove white film | No |

Comparing NO ROxyC diff 360 Electrostatic Application vs. competing adjunct technologies; UV, Sa no c il Hydro gen Pe rox ide Fogging, and To mi Ste ra Mist

| Product Name | EPA Registered for C.diff Spores? | Surface Coverage | Average Re-occupation time (Typical 225 SF Hospital Room) | Surface Damage | Capital Expense | Maintenance Contract | Cost Per Application (Typical 225 SF Hospital Room) |
|--|--|--|--|---|---|--|---|
| NO ROxyC diff 360 Electrostatic Application In-Use | Yes | Complete coverage of all surfaces, including all nooks and crannies | Less than 1 minute to apply, Room ready for re-occupation once surfaces are dry; approximately 5 minutes. | None | As low as \$600 for portable, battery-powered Electrostatic Sprayer. | None. Sprayer comes with one-year manufacturer warranty. | Approximately \$2.00 |
| UV Robots | No ** Recent study linked below, calls into question the effectiveness of UV against C.diff spores. | Line-of-Site kill only. UV does not reach into all the nooks and crannies. | Up to 60 minutes; two 15 minutes cycles in the room, one 15 minute cycle in the bathroom, plus set-up and positioning time | Over time, UV will begin to turn surfaces yellow, and microscopic cracks begin to appear in surfaces, which leads to new homes for deadly pathogens to begin to grow. | Typical UV Robots cost between \$75,000 & \$120,000 (Average \$87,500). Newer units are being introduced in the \$30,000 to \$40,000 range. | As high as \$33,000 per unit per year. | \$23.12 Average over 5 Years. * See study link below. |
| Sa no c il Ha lo Mist Hydro gen Pe rox ide Fogging | Yes | Complete coverage of all surfaces, including all nooks and crannies | 90 to 120 minutes | None | \$8,000 to \$10,000 | No Service Contract on machine. | \$12.71 Average over 5 Years. * See study link below. |
| To mi Ste ra Mist BIT Hydro gen Pe rox ide Fogging | Yes | Complete coverage of all surfaces, including all nooks and crannies | 75+ minutes | Yes | \$17,000 to \$56,000 | Manufacturer provides one-year warranty. | \$8.50 for non-C.diff treatment, as per the manufacturer. C.diff treatments are more. |

* http://safetyne.tame rica.com/images/UV_vs_HDS_Three_slides_July_2014.pdf

** <https://reflectionsip.c.com/2017/01/19/time-to-go-shopping-for-a-uv-c-system/>