When fighting pathogens in life science facilities

RISE TO THE CHALLENGE

Peroxigard™: One-step disinfectant cleaners powered by patented Accelerated Hydrogen Peroxide® (AHP®) technology

VIROX® TECHNOLOGIES INC.

Creators of ACCELERATED® HYDROGEN PEROXIDE Patented

PEROXigard®

Disinfectants for Life Sciences

SAVING LIVES STARTS WITH SAFEGUARDING YOUR RESEARCH

Your research is vital to paving the way for medical and other scientific advancements.

This is why infection control and biosecurity should be the cornerstone for any vivarium and life science facility. The threat of contamination is ever-present and gaps in infection control protocols can compromise the integrity of your results and affect the health and well-being of animals and team members working within the facility.

Threats from pathogens such as viruses, bacteria and fungi include:

- **Animal illness or changes in their behaviour**
  - This can directly interfere with study outcomes and may delay the progress of a research program
  - The presence of pathogens identified on a facility's bioexclusion list may result in additional restrictions and limitations
  - Infections can cause changes in animal physiology and behaviour – even subtle changes can impact the results of a research program
- **Human illness**
  - Pathogens can cause an outbreak among animal subjects, with the potential to affect human health
  - Pathogens such as influenza and coronavirus can cause outbreaks among staff members within a facility
  - Less severe infections can also be a detriment to a research program if they lead to prolonged time off or significant staff shortages
- **Financial and emotional burden**
  - Disease outbreaks can be associated with hidden costs as resources may need to be replaced
  - Funds may be lost if research programs require suspension or termination – this may also lead to the loss of progress of generational studies
  - Time loss due to disease outbreaks has the potential to interfere with the ability of students to graduate, and to halt years of progress within long-term projects

This guide serves to provide a foundation for best practices in cleaning and disinfection that can be achieved by implementing Peroxigard Disinfectants in your facility

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PEROXIGARD:
RISING TO THE CHALLENGE

As an EPA-registered, one-step disinfectant cleaner, Peroxigard offers:

EFFICACY

Cleans and achieves disinfection against key pathogens of concern in one step, with rapid and realistic contact times

SAFETY

When used as directed, Peroxigard is non-irritating to eyes and skin, non-corrosive and fragrance-free; promotes animal welfare while protecting people, equipment and the environment

SIMPLICITY

One technology to meet all your facility's cleaning and disinfection needs – available as a ready-to-use formulation, wipes or as an easy-to-dilute concentrate

Powered by ACCELERATED® HYDROGEN PEROXIDE® Patented

Formulated with Accelerated Hydrogen Peroxide (AHP) technology

Legacy disinfectant chemistries used in laboratories and life science facilities have been associated with poor safety profiles, both in terms of animal health as well as occupational health. They have also traditionally carried unrealistic contact times and required complicated procedures, making it difficult to achieve compliance in real-world conditions.

From SARS to COVID-19, AHP has been on the front lines in the war against pathogens for more than 20 years. Its unparalleled combination of safety and efficacy has made AHP the go-to technology within a wide array of industries, including hospitals, other healthcare settings, controlled environments and life science facilities.

THE POWER BEHIND PEROXIGARD: ACCELERATED HYDROGEN PEROXIDE

Although widely known that hydrogen peroxide can kill pathogens without being harmful to the user, it was not historically considered to be stable enough for commercial disinfectants. Scientists at Virox® Technologies however, advanced a way to harness the potential of this formulation and developed Accelerated Hydrogen Peroxide.

AHP is a patented synergistic blend of surfactants, wetting agents, chelating agents and low concentrations of hydrogen peroxide. The synergy dramatically increases hydrogen peroxide's germicidal efficacy, stability and cleaning performance – supported by over 55 peer-reviewed studies.

Powered by Accelerated Hydrogen Peroxide (AHP), Peroxigard products are formulated to meet the high standards for infection prevention and biosecurity in life science facilities

The difference between cleaning and disinfecting

It is not uncommon for the terms "cleaning," and "disinfecting," to be used interchangeably. It is important to recognize that they are two distinct processes that can be defined as follows:

- **Cleaning**
  - The process of physically removing dirt and debris from a surface. Although the cleaning process is vital for preventing the spread of pathogens, it may not actually kill any microorganisms.
- **Disinfecting**
  - The process of killing infectious microorganisms on surfaces, which can include bacteria, viruses and fungi. In environments where infectious microorganisms may be present, disinfection is required to ensure that the risk of disease transmission from contaminated surfaces and equipment is minimized.

Cleaning and Disinfection Work Together

When establishing protocols for cleaning and disinfection throughout the facility, the first step is always to remove visible soils from the surface, if present. If the surface is visibly clean, this step can be skipped.

It's important to determine whether the disinfectant used has detergency properties:

- If using a product that lacks detergency properties, surfaces would need to be pre-cleaned with a separate detergent prior to disinfection.
- If using a product similar to Peroxigard, that has surfactants built into its formulation, it can be used to clean and then disinfect the surface. This eliminates the complexities of using multiple products.

THE PROVEN DISINFECTION EFFICACY OF PEROXIGARD

2 in 1

Cleans and achieves disinfection against key pathogens of concern in one step, with rapid and realistic contact times

Surfaces and equipment throughout laboratories require regular cleaning and disinfection to prevent the spread of infection. These include:

- Benches
- Biosafety hoods
- Cages and crates
- Enclosure housing
- Equipment such as centrifuges and microscopes
- Feeding and watering equipment
- Floors, ceilings and walls
- Tables
- Transfer stations

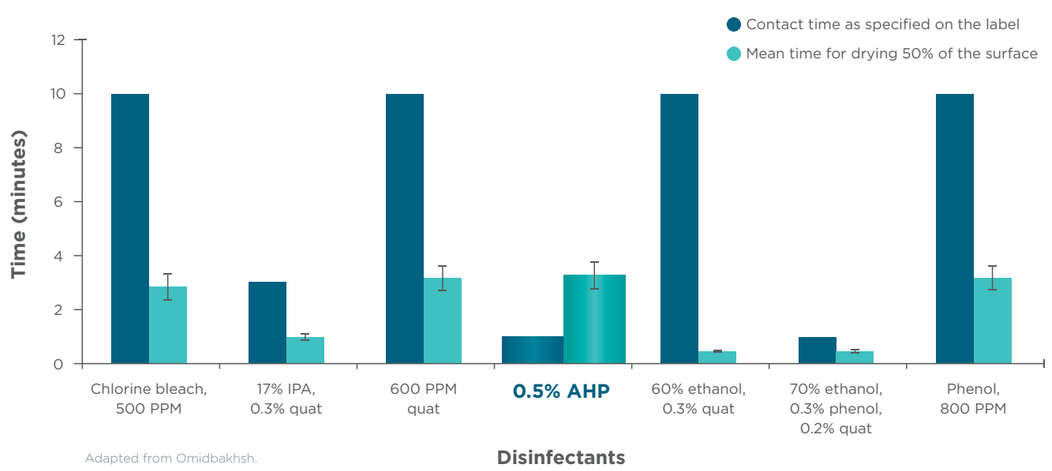
Using Peroxigard in research facilities can help improve disinfection protocols, ensuring compliance with guidelines and best practices.

AS LITTLE AS *1 minute* CONTACT TIME

Peroxigard has rapid and realistic contact times, providing the dual benefit of making disinfection faster and making compliance easier to achieve in real-world conditions*

In a study assessing disinfectant chemistry required contact times versus dry times, AHP was the only product that was able to remain wet on the surface long enough to reach the contact time listed on its label within a single application†

Drying time vs label contact time of common disinfectants[1†]



Adapted from Omidbakhsh.

*Refer to reference sheet or label for full list of claims, contact times and use directions.

†Results from a study that was conducted to determine the efficacy of selected chemistries against *Staphylococcus aureus* and *Pseudomonas aeruginosa*, related to their drying times (i.e. after one application) and label-specified contact times using a quantitative carrier test. The disinfectants were tested for their drying time on different surfaces (ceramic, stainless steel and porcelain) under ambient conditions. After their average drying time was measured, they were tested for their bactericidal activity in that time. In the absence of a standardized test to assess drying, the following protocol was used: 5 mL of each test solution was applied to a 30 cm^2 surface using a 20 cm^2 paper towel. The towel was folded twice; the solution was pipetted onto the surface and the towel was used to uniformly distribute the solution. The time for drying 50% of the surface was recorded as the drying time. The test was repeated 10 times for each solution on each surface and the results were averaged. The surface was rinsed with deionized water and dried between tests.

Protecting your animals: AHP effectively reduces pathogens without compromising safety

Within animal research laboratories, animal housing areas are a high-risk area for the transmission of pathogens. AHP – the technology behind Peroxigard – is highly effective against a broad spectrum of relevant pathogens*, including:

- **Hard-to-kill non-enveloped viruses** (e.g., Murine Norovirus, Minute Virus of Mice [Murine Parvovirus], Poliovirus)
- **Enveloped viruses** (e.g., HIV-1, Mouse Hepatitis Virus, Human Coronavirus)

- **Vegetative bacteria** (e.g., *Staphylococcus aureus, Salmonella enterica, Klebsiella pneumoniae*)
- ***Mycobacteria*** (e.g., *Mycobacterium bovis* [*surrogate for TB*])

- **Fungi** (e.g., *Trichophyton interdigitale, Microsporum canis, Candida albicans*)

Studies comparing the antimicrobial efficacy of Accelerated Hydrogen Peroxide to other commonly used disinfectants found AHP to be **highly effective compared to other products, demonstrating:**

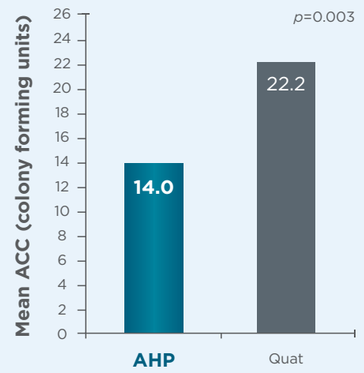
Greater reductions in microbial surface contamination compared to quaternary ammonium products[2,3]

Similar reductions in microbial contamination compared to chlorine dioxide – without the negative safety implications[4,5]

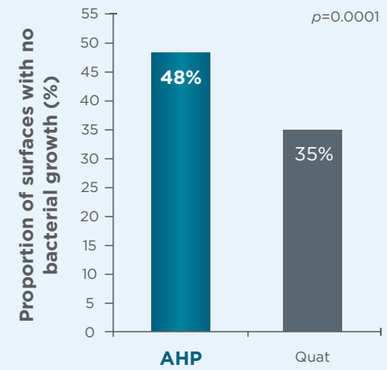
*Refer to product-specific reference sheet or product label for full list of claims, contact times and use directions. All claims listed may not be applicable to each format.

†Results from a 12-month, prospective, cluster-controlled, crossover trial in which hospital staff performed daily cleaning on 4 hospital wards using a disinfectant either containing 0.5% AHP or is quaternary ammonium-based. Each month, 5–8 high-touch surfaces in several patient rooms on each ward were tagged with a fluorescent marker and cultured before and after cleaning.

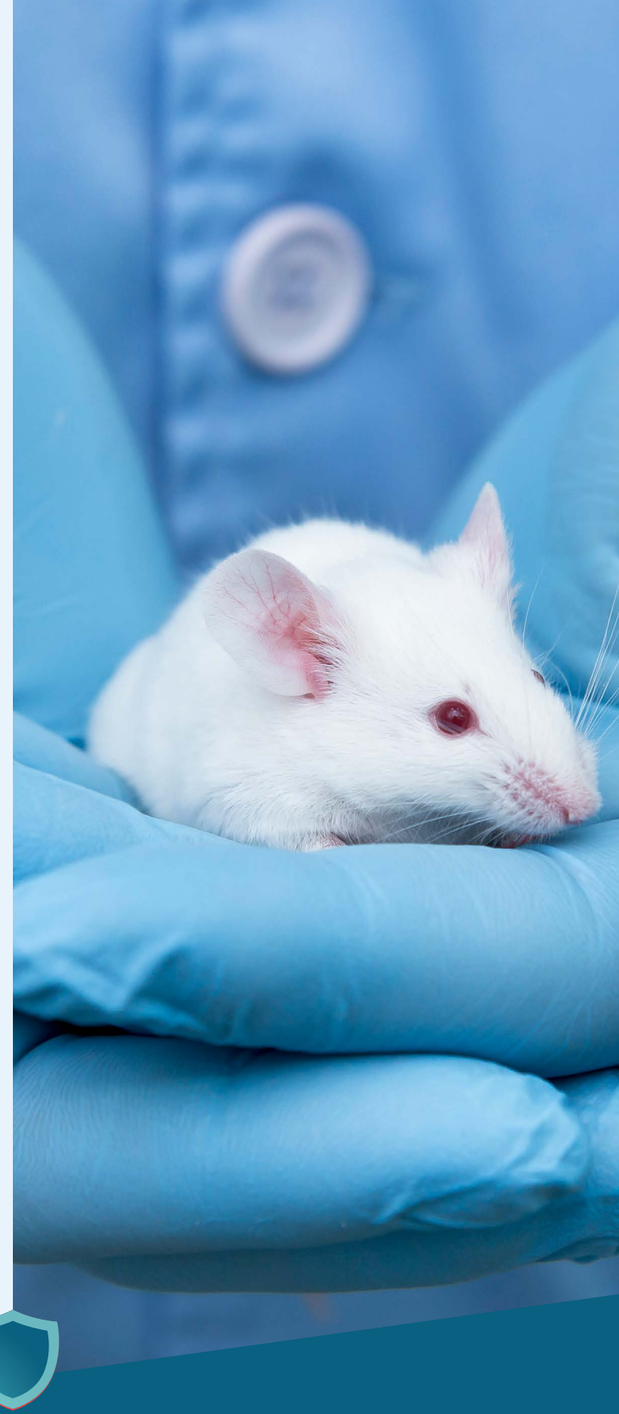
AHP significantly decreased mean aerobic colony counts (ACC) per high-touch surfaces vs quaternary ammonium (Quat)[2†]



A significantly higher proportion of surfaces experienced no bacterial growth with AHP vs the quaternary ammonium (Quat)-based solution[2†]



Adapted from Boyce J, *et al.*



In a study that compared five different disinfectant wipes, **AHP was the most effective product in preventing the transfer of bacteria** from one surface to another[6]

THE PROVEN CLEANING ABILITY OF PEROXIGARD

AHP utilizes both anionic and non-ionic surfactants within its formulation. Anionic surfactants have superior cleaning abilities in comparison to cationic surfactants as the electrical charge of anionic surfactants interact better with soil particles allowing for easier removal. In addition, non-ionic surfactants help in preventing redeposition of soils that have been lifted off the surface.

In a study that compared five different disinfectant wipes cleaning performance, only AHP achieved complete removal of both visible debris and protein with a single application.[7]

AHP can help improve cleaning and disinfection protocols

Highly soiled surfaces and equipment throughout life science facilities require regular cleaning and disinfection to prevent the spread of infection. These include:

- Cages and crates
- Enclosure and IVC housing areas
- Flooring
- Large animal enclosures
- Non-human primate areas
- Transportation vehicles

Protecting yourself and your team: Accelerated Hydrogen Peroxide (AHP) is effective against a range of pathogens

Although the focus of infection prevention in life science facilities is most often on animal pathogens, it is just as important to ensure that human health and occupational safety are also a priority. In fact, the same factors that make a disinfectant ideal for animal research laboratories can guide the selection of a product to protect team members as well. AHP technology originated in human healthcare, making Peroxigard an ideal disinfectant for use in areas commonly used by staff – whether in the midst of an outbreak or for everyday use.

Two studies conducted in a hospital setting have demonstrated that introducing AHP to disinfect commonly touched surfaces resulted in **lower incidence of hospital-acquired infections**, providing real-world evidence that supports the efficacy claims that Peroxigard carries.[2,8]

THE PROVEN SAFETY OF PEROXIGARD

When used as directed, Peroxigard is non-irritating to eyes and skin, non-corrosive and fragrance-free, promoting animal welfare while protecting people, equipment and the environment.

Protecting your animals

Within animal housing areas, it is especially important to select a disinfectant that does not compromise the safety of the animals.

Hydrogen peroxide, the only active ingredient in Peroxigard, breaks down into water and oxygen, leaving no active residue behind on surfaces. This formulation does not contain any fragrances or other artificial scents, which are known to disrupt physiologic processes (such as hormone disruption) in many animals.

In a study comparing three disinfectant wipe products, the Accelerated Hydrogen Peroxide (AHP) product was reported to have the least disruptive smell, and leave the least amount of residue behind on surfaces[9]

Furthermore, data from rodent facilities in which AHP is used have suggested that it does not have a negative impact on mouse breeding activity[4]

Considerations for biosafety hoods and animal transfer stations

Large equipment such as biosafety hoods and animal transfer stations often require cleaning and disinfection between uses, to prevent the transmission of pathogens from one procedure to the next.

When dealing with costly and often sensitive equipment, it is crucial that any chemicals used will not cause damage.

Commonly used legacy disinfectant chemicals are known to:

- Cause wear and tear on metals and other surfaces over time
  - Not only does this have cost implications, but it also impedes the cleaning process
- Cause micro-abrasions on these surfaces
  - These can create a space for pathogens to evade disinfection, elevating the risk of infection[10]

Peroxigard is highly compatible with a wide range of commonly used materials in animal laboratory settings, and has been validated for use on highly sensitive devices.[11] In particular, a case study led by an animal research facility determined that AHP was equally effective compared to chlorine dioxide, but is non-corrosive to stainless steel, which helps extend equipment longevity[5]

Common materials that are highly compatible with Peroxigard:

- ABS Plastic
- Ceramics
- High and low density plastics
- Laminate
- Porcelain
- Resin
- Silicone rubber
- Stainless steel

Hydrogen peroxide, the active ingredient in Peroxigard, breaks down into water and oxygen, no active residue remains on surfaces or equipment after its application

How disinfectants can affect human health

Many commonly used disinfectants have poor occupational safety profiles, and have been associated with neurological problems (e.g., headaches, dizziness), irreversible eye damage, skin irritation and occupational asthma.[12,13]

In one study, it was determined that the incidence of new-onset asthma was significantly greater among professionals who were exposed to certain commonly used cleaning products and disinfectants.[13]

As a non-irritating solution when used as directed, Peroxigard protects against some of the toughest pathogens, without compromising human or animal health and well-being

A safety profile like no other

The following is a side-by-side summary of the safety profile of commonly used disinfectant chemistries in lab animal research facilities.

DISINFECTANT	Peroxigard: Accelerated Hydrogen Peroxide	Chlorine Oxides	Sodium Hypochlorite	Quaternary Ammonium Compounds	Potassium Peroxymonosulfate	Hydrogen Peroxide
SAFETY (Undiluted Concentrates)						
Eye Irritation – Concentrates	Causes mild eye irritation	May cause **serious** eye damage	May cause **serious** eye damage	May cause **serious** eye damage	May cause **serious** eye damage	May cause **serious** eye damage
Skin Irritation – Concentrates	Causes mild skin irritation	May cause **severe** skin burns	May cause **severe** skin burns	May cause **severe** skin burns	May cause skin irritation	May cause **severe** skin burns
PPE Requirements	Gloves required	Gloves and goggles required	Gloves and goggles required	Gloves and goggles required	Gloves and goggles required	Gloves and goggles required
SAFETY (Ready-to-Use, Diluted Concentrate Solutions and Wipes)						
Eye Irritation – In-Use Solutions	Non-irritating	May cause **serious** eye irritation	May cause eye irritation	May cause eye irritation	Not available	May cause moderate eye irritation
Skin Irritation – In-Use Solutions	Non-irritating	May cause skin irritation	Most are non-irritating	Most are non-irritating	Not available	Non-irritating
PPE Requirements	None	Gloves and goggles required	Gloves required with higher concentrations	Goggles and gloves required	Goggles and gloves required	Goggles and gloves may be required
OTHER SAFETY FACTORS						
Occupational Health Concerns	None	May cause fire or explosion Strong oxidizer	Associated with occupational asthma	Associated with occupational asthma	Concentrate may cause respiratory irritation	High concentrations are strong oxidizers and may cause irritation
Environmental Profile	Biodegradable	Very toxic to aquatic life	May react with chemicals in wastewater	Toxic to aquatic life	May react with chemicals in wastewater	Some are toxic to aquatic life
Material Compatibility	Compatible with a wide range of commonly used materials	Higher concentrations are corrosive	Higher concentrations are corrosive	May leave sticky residues behind on surfaces	Surface damage possible with prolonged exposure	Higher concentrations may be corrosive

Note: The information in this document pertains to active ingredients in general, and may not capture the characteristics of every formulation. Always refer to the product label and SDS for any product-specific information.

THE SIMPLICITY OF PEROXIGARD

One-Step Disinfectant Cleaner and Deodorizer

One technology meets all your facility's cleaning and disinfection needs – available as a ready-to-use formulation, wipes or as an easy-to-dilute concentrate

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Disinfectants for Life Sciences

3 PEROXIGARD FORMATS FOR YOUR CONVENIENCE

Every life science facility is different. No one product or formulation may be appropriate for each facility to comply with cleaning and disinfection protocols.

Peroxigard offers the following formats that can be conveniently applied throughout your facility:

1 minute* CONTACT TIME

Peroxigard Wipes

- A simple way to clean and disinfect while dispensing a consistent and repeatable amount of disinfectant, minimizing variability and maximizing performance
- By employing a disposable wipe protocol, unwanted pathogens are not transferred across or between rooms that house animals (wipe and toss method)
- Ideal for cleaning and disinfecting biosafety cabinets, smaller laboratory equipment, cages and crates, work stations and other high-touch surfaces
- Peroxigard wipes have been demonstrated to achieve at least double the surface coverage compared to other commonly used products, requiring far fewer wipes for daily cleaning and disinfection, resulting in cost-saving benefits

EPA Reg. No. 74559-10
Available formats: 160 ct. (6"x7")

In a study that evaluated the value of disinfectant wipes vs traditional cloth cleaning methods, it was determined[14]:

- Compliance to cleaning/disinfection protocols were significantly higher with wipes
- The cleaning/disinfecting processes were faster with wipes, resulting in cost-saving benefits (e.g., reduced time required by employees to complete cleaning/disinfection tasks resulted in a savings of $38.58 per employee per day)

1 minute* CONTACT TIME

Peroxigard Ready-to-Use

- Disinfect in only 1 minute with no dilution required removing the risk of infection associated with improper dilution and not achieving contact time compliance*
- Ideal for cleaning and disinfecting high-risk areas such as biosafety cabinets, laboratory equipment and tools, cages, work stations, animal housing rooms, high-touch surfaces, and surgical suites
- Cleans, disinfects and deodorizes in one step, increasing cleaning and disinfection protocol efficiency

EPA Reg No is 74559-9
Available formats: 32 oz, 1 Gal, 5 Gal, 30 Gal, 55 Gal

AS LITTLE AS 5minutes* CONTACT TIME

Peroxigard Concentrate

- Cleans and achieves disinfection contact time compliance against pathogens of concern in one step. Two times faster than leading concentrate disinfectant products
- Ideal for use on vinyl, sealed concrete, stainless steel, plastic, and other surfaces associated with floors, walls and ceilings
- No activation required and has a long shelf life. Remains effective for up to 90 days when diluted
- Formulated to be gentle on hard non-porous surfaces while achieving broad spectrum disinfection

EPA Reg. No. 74559-4
Available formats: 1 Gal, 5 Gal, 55 Gal

Accelerated Hydrogen Peroxide (AHP) resulted in significant cost savings vs chlorine dioxide formulations.

Although appearing to have a premium sticker price, a price analysis determined that AHP was more cost-effective over time, based on the following factors[15]:

- Fresh solutions of chlorine dioxide needed to be prepared on a weekly basis, requiring a complicated process of mixing and activation
  - o This resulted in more wasted product (as bottles needed to be switched every 7 days) and increases the risk of using expired product
- The chlorine dioxide product was more laborious, requiring weekly collection and dispersing of bottles, as well as time required for mixing and activation

*Refer to reference sheet or label for full list of claims, contact times and use directions.

THE EASE OF IMPLEMENTING PEROXIGARD

PEROXigard®

Disinfectants for Life Sciences

Protecting your animals

Peroxigard concentrate can be used for routine cleaning and disinfection of animal housing areas by implementing the following process:

- Remove animals from the enclosure. Ensure that all objects have also been removed from the enclosure prior to cleaning and disinfection, including feed, watering devices, and items used for enrichment.
- Dispose of soiled bedding, and physically remove any animal waste and other visible soils (either scrape the waste by hand or flush the enclosure with water).
- Apply Peroxigard concentrate (diluted concentrate as per desired claim) evenly to the surface, from the bottom of the surface to the top, working from the inside of the enclosure outwards. Use a clean brush or microfibre cloth to dislodge any residual soils on the surface. Rinse the surface with water, from top to bottom, working from the inside of the enclosure outwards.
- **For small animal cages:** A cage wash system may be used in place of this step
- **For larger animal enclosures:** A foaming pressure washing application can help quickly and easily cover the entire surface, including hard-to-reach areas
- **Disinfection:** Apply Peroxigard concentrate (diluted at 1:64 - 1:16*) evenly to the surface, following the same procedure used for the pre-cleaning step above. Allow a 5-minute* contact time. Ideally, a foaming application can help achieve better surface coverage while using less chemical overall. Rinse the surface to get rid of excess foam, or simply allow to air dry.
- Objects such as water bottles, sipper tubes, stoppers, feeders, and other small equipment should be cleaned and disinfected separately, and rinsed before being replaced into the enclosure.
- If automatic watering lines are used, ensure to periodically clean, disinfect and rinse them to eliminate any pathogens that may be present

Peroxigard wipes and ready-to-use liquid can be easily applied to clean and disinfect your biosafety hood and animal transfer station by following this process:

- Remove objects from the hood, and physically wipe liquids or visible soils from the surface.
- **For easy-to-reach areas:** Use Peroxigard wipes to evenly wipe the surface.

  For areas that are harder to reach: Saturate a microfibre mop with Peroxigard ready-to-use liquid and evenly cover the surface.
- Allow a 1-minute* contact time, and simply allow the surface to air dry.

Note: Avoid applying liquid directly to sensitive equipment, filters and vents

*Refer to reference sheet or label for full list of claims, contact times, dilutions and use directions.

Protecting yourself and your team

Peroxigard can be used to disinfect high-touch surfaces in staff areas, including light switches, door handles and phones – helping to safeguard research staff against illness.

The AHP technology powering Peroxigard has also been demonstrated to be effective in decontaminating footwear.[16] This is especially important to prevent the spread of pathogens when team members are moving from one area within the facility to the next – particularly from high-risk to lower-risk areas.

Protecting other research areas

In addition to animal enclosures, biosafety hoods and transfer stations, several other surfaces throughout laboratories require regular cleaning and disinfection to prevent the spread of infection.

This includes tables, benches, flooring, and equipment such as centrifuges and microscopes that are commonly used. Using Peroxigard in animal research facilities can help improve cleaning and disinfection protocols, ensuring compliance with guidelines and best practices.

AN IDEAL DISINFECTANT FOR LIFE SCIENCE FACILITIES

Powered by Accelerated Hydrogen Peroxide (AHP), Peroxigard products are formulated to meet the high standards for infection prevention and biosecurity in life science facilities

As a one-step disinfectant cleaner, Peroxigard offers proven:

EFFICACY

Cleans and achieves disinfection against key pathogens of concern in one step, with rapid and realistic contact times

SAFETY

When used as directed, Peroxigard is non-irritating to eyes and skin, non-corrosive and fragrance-free; promotes animal welfare while protecting people, equipment and the environment

SIMPLICITY

One technology to meet all your facility's cleaning and disinfection needs – available as a ready-to-use formulation, wipes or as an easy-to-dilute concentrate

AS LITTLE AS **1 *minute*** CONTACT TIME

Peroxigard has rapid and realistic contact times, providing the dual benefit of making the process faster and making compliance easier to achieve in real-world conditions

PEROXigard®

Disinfectants for Life Sciences

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Virox® Technologies has been formulating revolutionary disinfectants for the war against pathogens for more than 20 years. As the creators of the Accelerated Hydrogen Peroxide® (AHP®) technology behind Peroxigard, we are committed to providing safer, more sustainable solutions to support a wide range of industries in building robust infection prevention programs. In addition to developing innovative products, we are equally committed to providing education and technical support to help facilities optimize their infection prevention protocols. Using Peroxigard with the right training and protocols can help protect improve your cleaning and disinfection practices.

Peroxigard is a registered trademark of Virox Technologies Inc., the developer of the AHP® technology.

Refer to reference sheet or label for full list of claims, contact times and use directions.

For more information, please visit ***www.peroxigarddisinfectants.com***

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