# VitalOxide®

Vital SOLUTIONS


Vital TECHNOLOGIES

# Mission Statement

Vital Technologies creates products that are environmentally safe, ecologically sound, and highly effective, with the end users' health and safety as our top priority.

# Why We Clean

There are generally two approaches to cleaning: First there's cleaning for appearance - when something looks dirty you clean it. Then there's cleaning for health. Cleaning for health is as practical to our life style as eating correctly, getting enough sleep, and exercising. Healthy cleaning doesn't only apply to our homes, but to all areas we inhabit: our workplaces, schools, restaurants, childcare centers, and health care facilities, to name a few. We all want to live in a healthy environment, yet many of the common cleaning and disinfecting products sold today contain harmful chemicals strong enough to cause eye, nose, and lung irritation, as well as rashes, headaches, nausea, and asthma.

The United States' Environmental Protection Agency estimates that cleaning products alone contribute approximately 8 percent of total non-vehicular emissions of volatile organic compounds (VOCs). Look under your kitchen sink, have you brought toxins into your home, all in the name of healthy cleaning?

In the real world, time allocated for a given task is tied to economy. For this reason, cleaning, sanitizing, and disinfecting should be approached systematically. We need a well thought out plan developed, implemented, and periodically revisited to make sure it's still functional. Resources spent on training and supplies to crate and support an effective cleaning program will amply repay its practitioners several times over. Costs will decrease due to the reduction of illnesses, employee sick days, and increased long-term gains generated by client comfort satisfaction and health. Along with source reduction, we will be helping to reduce the amount of harmful chemicals making their way into the water we drink, the air we breathe, the land in which we grow our food, and in our own bodies.

## The Hippocratic Oath…"First Do No Harm"

In the past, we have been given the choice of a "green chemistry" that was safe for the people and the planet, but all too often just did not work as well as conventional cleaning products. Now, after years of research and new product development, that has changed. We now have the advantage of choosing another way of achieving healthy cleaning.

As you follow this training manual, you will learn about a breakthrough technology, Vital Oxide. We have designed our product around a chemistry that is unique in all of nature. Effective on a broad spectrum of viruses, and bacteria, including "super bugs" like MRSA and H1N1, Vital Oxide breaks down to simple salt and produces no harmful byproducts.

# VITAL OXIDE

# The Vital Facts

Vital Oxide is an EPA-registered hospital disinfectant cleaner, mold killer, and super effective odor eliminator. It's ready to use, and no mixing is required – just spray, wipe, or fog right from the bottle. Ecologically sound, non-irritating to the skin, and non-corrosive to treated articles, Vital Oxide food contact surface sanitizer is NSF certified (no rinse required) and kills 99.999% of bacteria, including e Coli, Salmonella and Listeria in less than 60 seconds.

Vital Oxide kills bacteria by chemically altering certain amino acids and the RNA in the cell. These amino acids (RNA) are important building blocks in the proteins that help to form cell walls. When these proteins are destroyed, the cell wall ruptures and the organism dies.

Viruses are eliminated in a different way, by reacting with peptone, a water soluble substance that originates from the hydrolysis of proteins to amino acids, preventing protein formation. In the chemical reaction, Vital Oxide takes on an electron from the amino acid and reverts back to a chlorite ion. The amino acid gives up an electron, which is what chemists call oxidation.

## Anti-Microbial Action


Vital Oxide has been proven effective against Methicillin-resistant Staphylococcus aureus (MRSA), Norovirus, Legionella pneumophilia, E. coli and the H1N1 virus (Swine Flu) in testing conducted by certified independent laboratories under GLP conditions submitted too the USEPA. Removing mold and bacteria can involve strong chemicals that may trigger health problems, such as chlorine bleach products that produce trihalomethanes (THM) and haloacetic acids (HAAS) which are linked to cancer. Now there's an ecologically sound alternative.

- Vital Oxide is colorless, odorless, and so mild you can wash your hands in it. Plus, it will not harm hard or soft surfaces, or colorfast fabrics. Use it on shower curtains, under sinks, in basements, and in crawl spaces – anywhere mold and bacteria are found.

- Vital Oxide is shelf stable and ready to use, with no mixing required. Spray, wipe, or fog right from the bottle for hospital grade disinfection. For economy, Vital Oxide can also be diluted and still perform quickly to reduce bacteria on food contact surfaces by 99.999% in under 30 seconds – use it on your cutting board with no rinse required.

- Vital Oxide is stabilized to retain over 98% of its strength for over one year under normal storage conditions. At the same time, the stabilization is controlled to allow a rapid equilibrium between the "stabilized" and "free" chlorine dioxide. This means that Vital Oxide's total 2,000-ppm Chlorine Dioxide is available almost instantly as needed to destroy harmful microbial substances, and whatever is not used will be available in reserve for long-term residual activity.

- Vital Oxide includes components that dramatically decrease the size of its particles. This increases the ability of the active solution to spread on and to penetrate both hard and porous surfaces. This also makes it effective against airborne pathogens by reducing droplet size through the use of sprayers and foggers.

- Vital Oxide also has a unique ability to significantly reduce allergen levels in the most common household allergy triggers: dust mites, cat dander, and molds.

Q. What does it mean that a disinfectant product is “green”?

A. The EPA is currently reviewing the way third parties will be able to vary “green” claims on all disinfectant labels. EPA policy at this point does not allow green claims to be placed directly on any disinfectant product's label. While Vital Oxide is mild on skin, hard surfaces, and fabric, and will almost certainly qualify for green status when the designation is allowed, we cannot advertise this claim until it is permitted by the EPA. Vital Oxide is a powerful disinfectant able to kill some of the toughest and most resistant forms of bacteria and mold. The chemical composition of Vital Oxide is such that it has a minimal impact on the environment and contains no ozone harming volatile compounds (VOCs). Vital Oxide breaks down to a simple salt and produces no harmful by-products.

Q. With so many disinfectants and mold removers on the market, why should I choose Vital Oxide?

A. The easiest way to answer this question is to point out that not all disinfectants are created equal. When evaluating and comparing disinfectant products, take a close look at their core ingredients. Vital Oxide uses a unique chemical compound called chlorine dioxide. While other competitors and manufacturers have attempted to copy and produce a form of stabilized chlorine dioxide similar to Vital Oxide, our revolutionary formula is simply unequaled. Chlorine dioxide has been used during Anthrax attacks, in the aftermath of Hurricane Katrina, to purify drinking water, and most recently to kill MRSA in schools and hospitals.

Also consider carefully what kinds of chemicals you want around your children, employees, patients, students, and close family members. Most disinfectants and mold removers on the market are extremely toxic, but Vital Oxide gives you peace of mind that you are using an effective product that does not come with any alarming safety warnings and precautions. You no longer need to use harsh chemicals that increase VOCs in your environment. Using Vital Oxide can actually reduce the level of allergen in your home and workplace.

# Chlorine Dioxide ($CLO_2$), Stabilized Chlorine Dioxide, and Vital Oxide

## Chlorine Dioxide ($CLO_2$)

While chlorine dioxide has "chlorine" in its name, the chemistry is radically different from chlorine. As we all learned in high school chemistry, we can mix two compounds and create a third that bears little resemblance to its parents. For instance, by mixing two parts hydrogen with one of oxygen, liquid water is formed. We should not be misled by the fact that chlorine and chlorine dioxide share a word in common. The chemistries of the two compounds are completely different.

The chlorine dioxide molecule has one chlorine atom and two oxygen atoms. This combination creates a molecular free radical – a magnetic like attraction that seeks out electron donors and selectively oxidizes harmful bacteria and mold.

$CLO_2$ has been recognized for its powerful disinfecting properties since the early 1900s. It is used by municipalities to purify drinking water. Environmentalists now recommend its use in eco-friendly paper production. Produced on site, these treatments require sophisticated chemical generation equipment and limit practical use to only large scale industrial operations.

## Stabilized $CLO_2$

In an effort to commercialize $CLO_2$ for the general public, several companies have developed methods to produce "stabilized CLO2". These products usually require a two-step process mixing an acid "activator" into a chlorite solution to produce $CLO_2$. Yet even though these products claim to have the same amount of this key ingredient, it cannot be assumed that these products will all perform in an equal manner. The results are solutions of varying strength – and safety – with a shelf life of a few days to just a few hours.

## Environmental impact

Unlike Chlorine, $CLO_2$ produces no chlorinated byproducts or carcinogenic compounds such astrihalomethanes (THM) and haloacetic acids (HAAS). When $CLO_2$ is photo-oxidized by sunlight, it falls apart. The reaction process of chlorine dioxide with bacteria and other substances takes place in two steps. In the first stage the chlorine dioxide molecule accepts an electron and chlorite is formed ($ClO_3$). In the second stage chlorine dioxide accepts 4 electrons and forms chloride (Cl-). Both chlorate and chlorite are oxidizing agents. Chlorine dioxide, chlorate and chlorite dissociate into sodium chloride (table salt).

# The Difference between Cleaning, Sanitizing, and Disinfecting

Cleaning is a prerequisite for effective sanitization and disinfection. Organic deposits from food residues, skin cells, mold spores, oils, greases, and proteins are food for bacteria and are where bacteria live. These organic deposits can prevent the sanitizer or disinfectant from coming into contact with bacteria, viruses or spores.

Q. What is the difference between a cleaner and a disinfectant?

A. Cleaners are not registered with the EPA and cannot make public health claims on their labels about killing germs or having any anti-microbial action.

Q. Can I clean and disinfect at the same time?

A. In some cases you can clean and disinfect at the time, but this depends on how dirty the surfaces you are cleaning and disinfecting. The dirtier the surface, the less effective the disinfectant. Disinfectants need to contact the area to disinfect and cannot do this effectively with a barrier of dirt or grime in the way. Once the dirt has been wiped away, the disinfectant can get to work. Under lightly soiled conditions, you can clean and disinfect in the same step with just Vital Oxide. [1]

1 NOTE: The EPA requires all disinfectants carry the following label direction: “For heavily soiled areas, a pre-cleaning step is required.”

## Sanitizer

A sanitizer reduces, but does not necessarily totally eliminate microorganisms on a treated surface. The EPA registers food-contact surface sanitizers and sanitizing rinses for surfaces such as dishes, utensils, and food processing equipment, and for non-food-contact surface sanitizers such as carpet sanitizers, air sanitizers, laundry additives, and in-tank toilet bowl sanitizers. The FDA and EPA use the legal definition of a “Sanitizer” as a compound that is capable of killing 99.999% or a 5-log reduction of infectious organisms in a bacterial population within 30 seconds. “Sanitization” means the application of cumulative heat or chemicals on cleaned food-contact surfaces that, when evaluated for efficacy, is sufficient to yield a reduction of 5 logs, which is equal to a 99.999% reduction of representative disease microorganisms of public health importance.

Q. What is the difference between a 'food contact sanitizer' and a 'non-food contact sanitizer?

A. A food contact sanitizer, at a minimum, reduces the level of Staphylococcus aureus and Escherichia coli by 99.999% on a food contact surface within one minute. A potable water rinse is not allowed after sanitization of a food contact surface. A non-food contact sanitizer, at a minimum, reduces the level of Staphylococcus aureus and Klebsiella pneumonia or Enterobacter aerogenes by 99.9% on non-food contact surfaces within 5 minutes.

Q. What does "no rinse required on food contact surfaces" mean?

A. "No rinse required on food contact surfaces" is a safety rating given by NSF International (previously the National Sanitation Foundation). The NSF testing guidelines are a continuation of the USDA product approval and listing program, including the FDA 21. Vital Oxide is rated "no rinse required on food contact surfaces" category D2, meaning Vital Oxide is approved to use in commercial or residential kitchens to control bacteria, without the need to wash/rinse the area with water after Vital Oxide is applied.

Q. What is a Hospital Disinfectant?

A. As part of the EPA registration process, disinfectant products are put through rigorous testing to prove their efficacy and measure toxicity. The EPA registers three types of disinfectants: Limited, General, and Hospital. All three disinfectants destroy or irreversibly inactivate certain microorganisms on hard, inanimate surfaces, and objects.

## Disinfectant

A disinfectant destroys or irreversibly inactivates microorganisms on hard, inanimate surfaces and objects. The EPA registers three types of disinfectants based on the type of efficacy data submitted: Limited, General (or Broad-spectrum), and Hospital.

You can determine a "limited," "general," or "hospital" disinfectant by the microorganisms listed on the label.

- Limited – Must be supported by efficacy testing against either Salmonella cholerasuis (gram-negative bacteria) or Staphylococcus aureus (gram-positive bacteria). Limited disinfectants are found mostly in household use.

- General – Must be supported by efficacy testing against both Salmonella cholerasuis and Staphylococcus aureus. General disinfectants are used in commercial areas.
- Hospital – Must be supported by AOAC Use Dilution or AOAC Germicidal Spray efficacy testing against Staphylococcus aureus, Salmonella cholerasuis and Pseudomonas aeruginosa. The bacteria Pseudomonas aeruginosa hides behind biofilm and is difficult to eliminate. Killing this bacteria is required for Hospital Disinfectants.

Also as part of this evaluation process, products are assigned to a toxicity category. The categories range from category 1 (highly toxic) to category 4 (no exposure warnings required on the label). Vital Oxide received an EPA category 4 rating for all exposure routes with the exception of mild eye irritation. [2]

2 Refer to the Vital Oxide Toxicity Report

# The Good, the Bad, and the Ugly

## Bacteria

Beneficial bacteria are essential to many of the processes that support life. Everything from our digestive system, to organic gardeners' compost piles, to our favorite yogurt rely on friendly bacteria to support life. In fact, bacteria were some of the first life forms to appear on earth. These very small organisms made of only one cell exist either as aerobic bacteria (requires the presence of oxygen to live and grow) or anaerobic (can survive without the presence of oxygen in their immediate environment). Their ability to adapt creates both life giving opportunities and life threatening health problems.

Harmful bacteria have posed serious threats to our health for many centuries. Yet with the development of modern antibiotics, many of the diseases of ancient times are today largely controlled. However, due to the misuse of these "miracle cures", antibiotics have also allowed bacteria to once again adapt for survival, creating "super bugs" such as MRSA.

## Viruses

A virus is a microorganism smaller then a bacterium, which cannot grow or reproduce apart from a living cell. A virus invades a living cell and uses that cell's chemical machinery to keep itself alive and replicate. It may reproduce with fidelity or with errors (mutations), and this ability to mutate makes treatment more difficult. Viruses cause many common human infections. Examples of viral illness rang from the common cold, which is usually caused by one of the rhinoviruses, to acquired immunodeficiency syndrome (AIDS).

## Food-Borne Diseases

A food-borne disease is a disease caused by consuming contaminated foods. There are more than 250 know food-borne diseases. The majority of them are infectious and are caused by bacteria, viruses and parasites and can be highly contagious. All food-borne diseases enter the body through the gastrointestinal tract with the first symptoms including nausea, vomiting, abdominal cramps, and diarrhea.

## Biofilms

Biofilms are a collection of microorganisms surrounded by the slime they secrete, attached to either an inert or living surface. Biofilms present challenges due to their inherent characteristic of protecting inner organisms from contact with disinfectants. Vital Oxide's active ingredient, chlorine dioxide, is effective at removing biofilms.[3]

## Mold & Mildew

Mold and mildew are fungi that can be found both indoors and outdoors. Molds grow best in warm, damp, and humid conditions, spreading and reproducing by making spores. Mildew requires moisture. The optimal growth range for mildew is 70 to 93 percent relative humidity. Mold spores can survive in harsh conditions, such as dry conditions, that do not support mold growth.

## Odor

Unpleasant odors have been recognized as a warning sign of potential risks to human health. Odor sensations from environmental sources might cause health symptoms that are dependent on many environmental factors. Odors are not only warning signs but also maybe the direct cause of some symptoms.

The following Q&A is from an interview with Anne Camper from the Center for Biofilm Engineering (CBE). Ms. Camper is an Associate Professor of Civil Engineering and an Associate Dean for Research and Graduate Education, Montana State University, Bozeman, Montana.

### Q. What is biofilm?

A. Biofilm can best be described as "bugs on surfaces stuck on slime." A biofilm is a complex structure of bacteria that functions as a community. Its sticky polymers attach it to a surface, and as it grows, it takes on the appearance of microscopic mushrooms and streamers.

3 See appendix information on CL02

## Q. Where does biofilm form?

A. Wherever there is water. It is found in virtually every aquatic environment. Fish tanks are an obvious example, however, it forms in many places one may not expect, such as in the form of plaque on teeth almost immediately after brushing. It can also form inside the human body, making it of concern for medical implants. Yet, not all biofilm is bad. For instance, bio-mineralization may help recover precious metals. It begins with attachment where biofilm cells have congregated, followed by colonization, then growth. This process can be very short, usually within hours.

Q. How is biofilm different from suspended (planktonic) bacteria?

A. Being attached rather than suspended makes a world of difference. Biofilm organisms have an enhanced survival mechanism. Bacteria change as soon as they are attached to a surface. The most obvious change is that they excrete a slimy material. Biofilm bacteria turn on a whole different set of genes, which makes it a significantly different organism to deal with. Biofilm behavior is much more complex because they live in organized communities. They are resistant to biocides and antimicrobial agents. Disinfectants are effective for killing single cells, but not clumps because they only kill those on the outside. These outside cells sacrifice themselves for the rest of the colony.

Q. How do you prevent or eliminate biofilm?

A. You can't prevent it or eliminate it, but you can manage it. The best ways to do this is by modifying surfaces (there is no biofilm-proof surface, but some are easier to clean, such as stainless steel), adding biocides or chemicals to a watering system, mechanical cleaning, and various other pretreatment strategies such as reverse osmosis.

# Definitions

- *Cleaning* - is a prerequisite for effective Sanitization and Disinfection. Organic deposits from food residues, skin cells, mold spores, oils, greases and proteins are food for bacteria and are where bacteria live. These organic deposits can prevent the sanitizer or Disinfectant from coming into contact with bacteria, viruses or spore.

- *Sanitizer* - A sanitizer reduces but does not necessarily eliminate microorganisms on a treated surface to levels that are considered acceptable according to current health codes or regulations. EPA registers food-contact surface sanitizers for surfaces such as sanitizing rinses for dishes, utensils and food processing equipment, and nonfood-contact surface sanitizers such as carpet sanitizers, air sanitizers, laundry additives, and in-tank toilet bowl sanitizers. The FDA and EPA use the legal definition of a compound that is capable of killing 99.999% or a 5-log reduction of infectious organisms in a bacterial population within 30 seconds.

- *Disinfectant* - A disinfectant destroys or irreversibly inactivates microorganisms, on hard, inanimate surfaces and objects. EPA registers three types of disinfectants based on the type of efficacy data submitted: Limited, General (or Broad-spectrum), and Hospital.

- *Hospital Disinfectant* - A disinfectant that is a general or broad-spectrum disinfectant and is effective against the bacterial pathogen Pseudomonas aeruginosa is a Hospital disinfectant. These disinfectants are generally for use in hospitals, clinics, dental offices, or other health care related facilities.

- *Biofilms* - Under certain conditions biofilms may develop from bacteria, molds and yeast. These biofilms can be invisible on surfaces. Biofilms present challenges to the food service industry due to their inherent characteristic of protecting inner organisms from contact with disinfectants.

- *Food-contact surface* - (1) A surface of equipment or a utensil with which food normally comes into contact; or (2) A surface of equipment or a utensil from which food may drain, drip, or splash (a) Into a food, or (b) Onto a surface normally in contact with food.

- *Non-food-contact surface* - Floors, walls, areas under tables, counters, and other areas such as restrooms, where food is not prepared, stored or consumed.
- *Porous Surface* - Able to absorb fluids. Example: Clothing and Fabrics. Test for color fastness on inconspicuous spot first. Fabric covered furniture, clothes, drapes and curtains are examples of porous objects which can matter and sanitize and the objects. Water Vacuums such as Hoover and HEPA type suction cleaning systems in bags can be used to help.

- *Semi-Porous Surface* - Permitting the passage of certain molecules and hindering that of others. Example: wood, plaster, dry wall, concrete, and carpet.

- *Non-Porous Surface* - The Opposite of Porous. Will not absorb fluid. Example: glass, metal, plastic, counter tops, appliances, stainless steel and glazed ceramic tile.

Note: The presence of food debris or dirt on nonfood contact surfaces may provide a suitable environment for the growth of microorganisms, which employees may inadvertently transfer to food. If these areas are not kept clean, they may also provide harborage for insects, rodents, and other pests.

# Recommended Applicators

These time-saving tools ensure correct dilutions and application of Vital Oxide

- Microfiber cloths, wipes and mops have been shown to be more effective at removing smaller particles than cotton fibers.

- *Proportioner* - Vital Technologies provides proportioning systems to ensure correct dilutions of Vital Oxide. Empty 32oz labeled bottles available. Vital Oxide Proportioner Titration Test Kits - A Vital Oxide $CLO_2$ Test Kit is available to ensure proper performance of the proportioner over time and, when necessary, to comply with industry or government regulations.

- *Spray bottle* - The 32oz Vital Oxide spray bottle is best used when a smaller amount of product is called for to treat a localized area.

- *Pump sprayer* - Similar to application with a spray bottle, the use of a pump sprayer will allow for a greater output of product. This method is most suitable when the area to be treated is large, a very high output is desired or when saturation is necessary.

- *Power Fogger* [4] - The Vital Oxide Power Fogger is available to treat small to medium size jobs. It comes equipped with a rotary dial to allow for an adjustment of output volume and particle size. This flexibility makes the Vital Oxide Fogger a good choice given its' versatility to apply a heavy coat of product or to use a much smaller particle which may be fogged to eliminate airborne contaminants. Particle size is adjustable between fifteen and thirty microns.

4 Note: A variety of specialized equipment is available to increase efficiency limiting both time spent and product used on the job.

- *Electrostatic Sprayers* - Some jobs will require one hundred percent coverage of surfaces in an area. When this is the case, an electrostatic sprayer is the best option. As Vital Oxide particles leave the sprayer wand, they are electrically charged resulting in an attraction of the particles to an object's surfaces. Think of this electrical attraction similarly to magnetic attraction. Rather than targeting the forward facing surfaces only, the charged particles will envelope the objects in a room and will result in superior coverage. When it is imperative that the product reaches all surfaces, use an electrostatic sprayer. Two electrostatic sprayers are offered; the XT3 and Suitcase Sprayer, each with their own advantages.

- *XT3* - This dolly-mounted sprayer is equipped with a three-gallon tank, air compressor, twenty-five feet of hose and spray wand. The unit can accommodate an additional seventy five feet of hose and dispenses product at a rate of two gallons per hour. This sprayer, although dolly mounted, is a heavier machine and is best suited for large facilities where ultimate maneuverability is not critical. Particle size is forty microns.

- *Suitcase Sprayer* - Another option in the electrostatic line-up is the SC1 Suitcase Sprayer. This lighter weight, wheeled sprayer offers greater maneuverability than the XT3. All components are contained in a single housing. A standard six-foot hose can be replaced with a fifteen-foot hose and the machine dispenses at a rate of one gallon per hour. The internal tank will accommodate up to one and a half gallons of Vital Oxide. Particle size is forty microns.

- *Back Pack Sprayer* - Offering unparalleled maneuverability, the lightweight Back Pack Sprayer is the preferred application method among many service providers and facilities needing to treat multiple spaces. Ideal for overhead application, this sprayer gives the user the flexibility to adjust the output of Vital Oxide from a fine mist to a heavier particle used to thoroughly coat or saturate a porous surface. This sprayer is capable of producing droplets between ten and fifty microns. The internal bladder allows for one and a half hours of continuous use before needing to refill.

Note: Any of the above mentioned applicators are to be used solely for the application of Vital Oxide. Use of other products within the same applicator is prohibited and will void any warranty.

# Safety

It is a violation of Federal Law to use this product in a manner inconsistent with its labeling. Test fabric for color fastness. Vital Oxide contains a diluted oxidizing agent. Do not mix with vinegar or acidic cleaners. All personnel performing housekeeping maintenance shall follow guidelines of facility Health and Safety Program, chemical MSDS sheets and facility specifications. Follow the label directions carefully when using any cleaners, sanitizers or disinfectants.

## Storage

- Store large quantities in buildings that comply with OSHA 1910.106 and prevent build-up of vapors by maintaining continuous flow of fresh air. [5]
- Do not store above 120 ˚(F) or near open flame. Keep away from heat, strong sunlight, and strong acids.
- Keep container closed when not in use. Do not transfer contents to unlabeled bottles or other unlabeled containers.

## Disposal

Rinse empty container. Then offer for recycling or reconditioning, or puncture and dispose of in sanitary landfill, or incineration. Wastes resulting from the use of this product may be disposed of on site or an approved waste disposal facility. Discard excess or used Vital Oxide solution in drain with running water. See Appendix 4 for Specimen label.

## Shelf Life

- Unopened – 24 months in original container
- Opened – 12 months in original container

[5] See Specimen label

# GUIDELINES

# Guidelines for Sanitizing Food Preparation Areas

Public health and food safety require an ongoing function of constantly evaluating, reviewing, implementing improvements, and monitoring success. In the following section, we address a working game plan, and the tools needed for sanitization of commercial food preparation areas. Designated by the International Sanitization Foundation (NSF) as a no rinse required food contact surface sanitizer, Vital Oxide is a versatile multi-purpose solution that can be used full strength, or diluted for multiple application.

## Terms Used [6]

"Food-contact surface"
"Non-food-contact surface"
"Cleaning"
"Disinfection"
"Sanitizing"

[6] see full description in definition section

## Recommended Equipment

- Microfiber cloths
- Proportioner
- Test Kits
- Sprayers and foggers
- Need in non-ventilated confined spaces.
- (1) 3M half face reusable respirator with 3M Model #(6002) chlorine dioxide cartridge
- (2) Safety Eye Protection

## Dilutions

Vital Oxide comes in a full strength formula Ready To Use (RTU) and can be diluted down. Automatic mixing units can be truck mounted or mounted at your home. Vital Oxide is formulated Ready To Use (RTU) full strength USEPA Hospital Disinfectant for non-porous surfaces.

- 5:1 dilution, Vital Oxide is used as Fabric and Carpet Sanitizer. First test for color Fastness in an inconspicuous space. Do not used on wool fabrics.
- 12:1 dilution, Vital Oxide is used as a no rinse required non-porous and food surface contact surface sanitizer.

## Hot Spots/ Area of Attention

- Beverage, Ice and Water Equipment - Iced tea dispensers, carbonated beverage dispenser nozzles, beverage dispensing circuits or lines, water vending equipment, coffee bean grinders, ice makers, and ice bins must be cleaned on a routine basis to prevent the development of slime, mold, or soil residues that may contribute to an accumulation of microorganisms.

- *Refrigeration units* - Refrigeration units can harbor food and organic material/debris that can foster microbiological growth, even at cold temperatures. Refrigeration units in disrepair may no longer be capable of properly cooling or holding foods at safe temperatures. In addition, although refrigerator temperatures are set at safe levels, during use and at rush times, the refrigerators may not maintain the desired temperatures. It is crucial to incorporate refrigeration units into your daily cleaning regime and to immediately clean any spills.

- *Can Openers* - The cutting or piercing parts of can openers will accumulate food particles that, if left untreated, will lead to an accumulation of microorganisms. Spraying with Vital Oxide easily treats these small and sometimes hard to reach areas.

- *Cutting Surfaces* - Cutting boards and blocks that become scratched and scored may be difficult to clean and sanitize. As a result, food particles and microorganisms transmissible through food may accumulate. These microorganisms may be transferred to foods that are prepared on such surfaces. After thoroughly cleaning, saturate the surface with Vital Oxide and allow to air dry.

- *Sponges, Cloth Towels and Microfiber Towels* - Sponges are not recommended for cleaning food preparation areas as they can harbor bacteria. Paper towels are acceptable for cleaning only, not sanitization. They can be used to clean up food spills and to clean food preparation areas, but they should be immediately disposed of when finished cleaning. Microfiber cloths retain more liquid than towels and are manufactured with such fine fibers that they tend to “hold on to” particles. If re-useable cloths are used, they should be placed into a separate laundry area and completely sanitized before reuse. Between uses, a cloth may be left submerged in a pail of fresh Vital Oxide at a 12:1 dilution.

- *Countertops* - Countertops should be thoroughly cleaned with hot soapy water before you begin to prepare food and again after coming into contact with any food products. Make sure to use only those cleaning products designed and tested for use in food preparation areas, and use them according to the manufacturer's instructions. Vital Oxide is a “No Rinse Required Sanitizer for Food Contact Surfaces (D-2) by the National Sanitary Foundation (NSF). Many products not designed or tested for use in food preparation may leave harmful residues.

- *Dishes and Utensils* - Make sure to thoroughly wash your dishes and utensils with hot soapy water, then rinse and sanitize. If you need to use the same dish or piece of equipment more than once, wash and rinse it thoroughly before you switch to the next food product. Scrape and pre-wash, then wash with a good detergent. Rinse with potable water, then sanitize by immersion in 12:1 dilution of Vital Oxide. Place on a rack or drain board to air dry. Do not rinse or wipe.

- *Tables* - After each customer, tables should be wiped using a microfiber cloth and Vital Oxide. Betweens use, a cloth may be left submerged in a pail of fresh Vital Oxide at a 12:1 dilution.

### Non-Food Contact Areas

It is important to note the presence of food debris or dirt on nonfood contact surfaces may provide a suitable environment for the growth of microorganisms, which employees may inadvertently transfer to food contact areas. It is therefore equally important to clean and sanitize these areas

- *Floors* - After floor cleaning, Vital Oxide can be fogged or electrostatically sprayed on floors, below counters and cabinets, around an on machines, sinks, beverage fountains/taps and ice machines to sanitize in areas not easily accessible by physical methods. The Vital Oxide Proportioner can be used to directly fill a mop bucket. It is important to note, however, that for proper sanitization to occur, the mop head itself must be sanitized using the correct protocol.

- *Carpet* - Carpet Sanitizing - Carpets, by design, are soil and organic matter magnets. The tight knit fibers make carpets difficult to keep clean and microorganisms, allergens and debris builds up in carpets. Typical cleaning methods include HEPA vacuuming, liquid application and suction removal and steam liquid application and suction removal. Vital Oxide is a registered Carpet Sanitizer. Carpets can be sanitized and deodorized using Vital Oxide in your liquid application method. For synthetic carpet fibers such as nylon, olefin or Polypropylene- not intended for use on wool carpet. Test for color fastness in inconspicuous area. Carpet should free of excessive soil before applying. Apply at a dilution of 5:1. Allow for a dwell time of 10 minutes. Do not rinse or use an extraction wand to remove excess moisture. Carpet can air dry or fans may be used if carpet needs to dry faster. Vital Oxide works by oxidation to eliminate odors. Simply spray, fog or wipe on and allow to air dry to provide long lasting residual deodorizing action. VITAL OXIDE must come into contact with the cause of the odor to be effective. Vital Oxide is great for synthetic carpet fibers such as nylon, olefin or polypropylene - not intended for use on animal fibers such as wool carpet. Test for color fastness in an inconspicuous area. Carpet should be clean and free of excessive soil before applying. Apply by sprayer at a rate of approx. 22 oz. per sq yd. Vital Oxide must come onto contact with contaminant to work. Allow to dwell for 10 min. Do not rinse, use extraction wand and dry stroke carpet to remove excess moisture. Carpet can air dry or fans may be used in order to dry carpet faster.

- *Seats, Booths, Benches* - Use Vital Oxide and microfiber cloths to clean, deodorize and sanitize vinyl cushions and chair covers.
- Stainless Steel - Use Vital Oxide on stainless steel surfaces to both sanitize and polish. Vital Oxide does not leave streaks after all dirt and debris is removed. Microfiber cloths perform well for this task.

- *Restroom Cleaning* - Thoroughly clean restrooms based on usage. In high-traffic areas such as retail stores and common areas of lodging facilities, restrooms should be cleaned more often than in office situations where the traffic load is less. Visual inspection of facilities provides input into the proper frequency of cleaning events.

## Contact Times

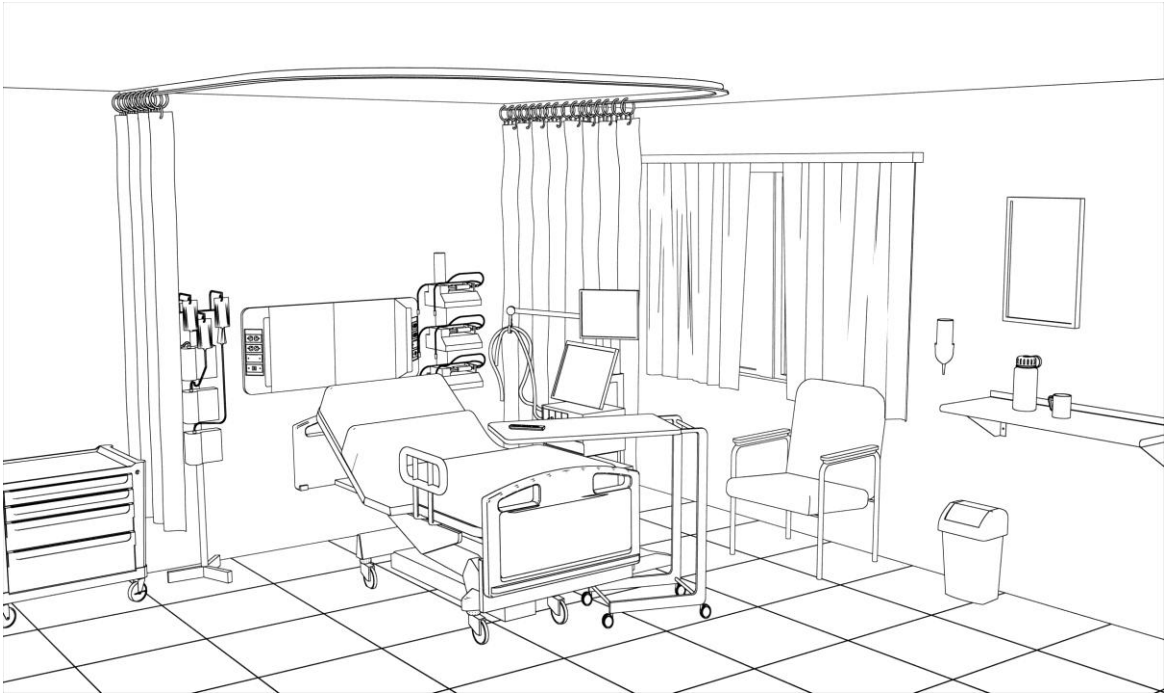
Vital Technologies has published a contact time chart illustrating the approved kill times on various organisms. To view this chart, refer to Test summary section of manual. Vital Oxide Diluted at 12:1 (no rinse required on food contact surface rating) allows a user to simply wet a surface and allow to air dry. The elapsed time necessary to air dry is sufficient to effectively sanitize a surface.

## Monitoring

Foodservice employees shall visually and physically inspect food contact surfaces of equipment and utensils to ensure that the surfaces are clean.

# Guidelines for Healthcare Facilities

Facility managers, infection control officers, boards and building service contractors working together to implement effective cleaning and disinfection programs can help stem the spread of illness within Healthcare Facilities.



## Terms Used [7]

"Porous Surface"
"Semi-Porous Surface
"Non- Porous Surface"
"Cleaning"
"Disinfection"
"Sanitizing"
"Biofilms"

[7] See full description in definition section

## Recommended Equipment

- Microfiber cloths
- Proportioner
- Test Kits
- Sprayers and foggers
- Need in non-ventilated confined spaces.
- (1) 3M Half face reusable respirator with 3M (6002) chlorine dioxide cartridge
- (2) Eye Protection goggles

## Dilutions

Vital Oxide comes in a full strength formula Ready To Use (RTU) and can be diluted down. Automatic mixing units can be truck mounted or mounted at your home. Vital Oxide is formulated Ready To Use (RTU) full strength USEPA Hospital Disinfectant for non-porous surfaces.

- 5:1 dilution, Vital Oxide is used as Carpet cleaner and Carpet Sanitizer.
- 12:1 dilution, Vital Oxide is used as a no rinse required non-porous and food surface contact surface sanitizer.

Automatic mixing units or the Vital Oxide Proportioner are available through Vital Technologies to provide the two primary working dilutions (food surface sanitizer/cleaner and carpet sanitizer & deodorizer).

## Frequency of Cleaning, Sanitizing or Disinfection

Based on the amount of dirt, grime and dust accumulates, the frequency of general cleaning can be adjusted from daily to weekly to monthly. Sanitizing and disinfection procedure frequency is based on regulatory requirements for the application at hand, i.e. food service or healthcare type applications.

## Hot Spots/ Areas of Attention

- *Ceiling Tiles* - Use Vital Oxide in a 5:1 dilution in a fogger or fine mist sprayer after micro-cleaning ceiling tiles to provide the best cleaning and disinfection method.

- *Carpet* - Carpet Sanitizing - Carpets, by design, are soil and organic matter magnets. The tight knit fibers make carpets difficult to keep clean and microorganisms, allergens and debris builds up in carpets. Typical cleaning methods include HEPA vacuuming, liquid application and suction removal and steam liquid application and suction removal. Vital Oxide is a registered Carpet Sanitizer. Carpets can be sanitized and deodorized using Vital Oxide in your liquid application method. For synthetic carpet fibers such as nylon, olefin or Polypropylene- not intended for use on wool carpet. Test for color fastness in inconspicuous area. Carpet should free of excessive soil before applying. Apply at a dilution of 5:1. Allow for a dwell time of 10 minutes. Do not rinse or use an extraction wand to remove excess moisture. Carpet can air dry or fans may be used if carpet needs to dry faster. Vital Oxide works by oxidation to eliminate odors. Simply spray, fog or wipe on and allow to air dry to provide long lasting residual deodorizing action. VITAL OXIDE must come into contact with the cause of the odor to be effective. Vital Oxide is great for synthetic carpet fibers such as nylon, olefin or polypropylene - not intended for use on animal fibers such as wool carpet. Test for color fastness in an inconspicuous area. Carpet should be clean and free of excessive soil before applying. Apply by sprayer at a rate of approx. 22 oz. per sq yd. Vital Oxide must come onto contact with contaminant to work. Allow to dwell for 10 min. Do not rinse, use extraction wand and dry stroke carpet to remove excess moisture. Carpet can air dry or fans may be used in order to dry carpet faster.

- *Floors* - Floors may be cleaned using a full strength, 12:1 or 5:1 dilution based on dirt load levels and disinfected using the full strength solution, dependent upon the cleaning criteria and objectives.

- *Frequently touched surfaces or touch points* - Regularly clean and/or disinfect surfaces that are frequently touched. These include doorknobs and door push plates, light switches, handrails, elevator buttons and panels, telephones, toilet flush handles, computer keyboards, alarm controls, door bells, countertops and desks, and drawer handles and knobs, to name a few. Use RTU Vital Oxide cleaner and disinfectant on these surfaces. Residential and commercial touch points include Ceiling Fan switches, Vent knobs, Ceiling light switches, walls-next to doorways and corners, Door Handles, Cabinet Handles, Light Switches, Telephones, Computer/Calculator Keyboards, Copier touch pads, Writing Utensils, drinking water dispenser switches, office machine touch pads, vehicle steering wheels, handles and dashboard switches, Appliance Handles, Shelves, books, objects, Dressers, Closets, Electronic Equipment and desks.

- *Elevators* - Regularly clean and disinfect the buttons, doors, handrails and other surfaces frequently touched. An elevator can be a mold, bacteria and germ delivery device. The Inside of a elevator shaft is the perfect breeding ground for mold, germs and bacteria as it is a dark, dank, warm climate where moisture can accumulate on the floor. The elevator acts as a plunger forcing this contaminated air into the elevator and spread to other floors of the facility.

- *Walls* - Walls may be cleaned, sanitized or disinfected using the appropriate dilution. Microfiber cloths and mops have been evaluated and shown to attract and hold smaller diameter particles than cotton mops, single use mop heads eliminate cross contamination, reduction in water usage and use and exposure to disinfectant chemicals, microfiber mopping is more ergonomic.

- *Restroom cleaning* - Thoroughly clean restrooms based on usage. In high-traffic areas such as retail stores and common areas of lodging facilities, restrooms should be cleaned more often than in office situations where the traffic load is less. Visual inspection of facilities provides input into the proper frequency of cleaning events.

- *Biofilms* - Under certain conditions biofilms may develop from bacteria, molds and yeast. These biofilms can be invisible on surfaces. Biofilms present challenges to disinfection effectiveness due to the inherent characteristics of a biofilm, which protect inner organisms from contact with disinfectants. Vital Oxide's active ingredient chlorine dioxide is effective at removing biofilms.

Ensure that cleaning staff members have easy access to cleaning plans, product labels, MSDS's and method cards. Use the appropriate cleaner, sanitizer and/or disinfectant diluted according to the label instructions. Do not mix Vital Oxide with vinegar or acidic cleaners.

### Fresh cleaning solutions

Use appropriate cleaning methods to reduce the spread of contamination in your facility. These include Single Area Use mopping, double-bucket techniques, frequent changes of cleaning solutions in buckets, use of sprayer-based applications and color-coded cleaning tools.

Use appropriate mopping methods to reduce the spread of contamination in your facility.

Dedicated mop head cleaning using microfiber mops – the most hygienic mopping method. Prepare Vital Oxide cleaning solution at full strength for heavily soiled areas, body fluids, black water releases and moldy/mildew surfaces. The goal is to remove all organic matter.

### To Deodorize

Vital Oxide works by oxidation, not by masking of odors. Eliminates odors caused by fire smoke, tobacco smoke, musty odors, stale-cooking odors. Simply spray or wipe on full strength and let air dry to provide long lasting residual deodorizing action. When fogging apply 1 quart per 2000 cubic ft. following spray applicator manufacturer's directions for use. Vital Oxide must come into contact with the cause of the odor to be effective. For pet urine stains in carpet, blot urine as dry as possible then saturate stain with VITAL OXIDE through carpet pad.

## Disinfectant Concentration and Application Verification/Test Kit

The effectiveness of chemical sanitizers is determined primarily by concentration and contact times. The active ingredients must come in contact with the microorganisms for a minimum period of time to complete the molecular damage and render the microorganisms ineffective. The same holds true for deodorizing, or oxidizing odor molecules, concentration and application method effects the ability of the active ingredients to come in contact with the odor molecule and oxidizing it to non-odor constituents.

To verify that the application concentration is proper, a simple strip test for chlorine dioxide can be used to verify the proper concentration. A more accurate method is a titration method available as a small pool testing-like kit.

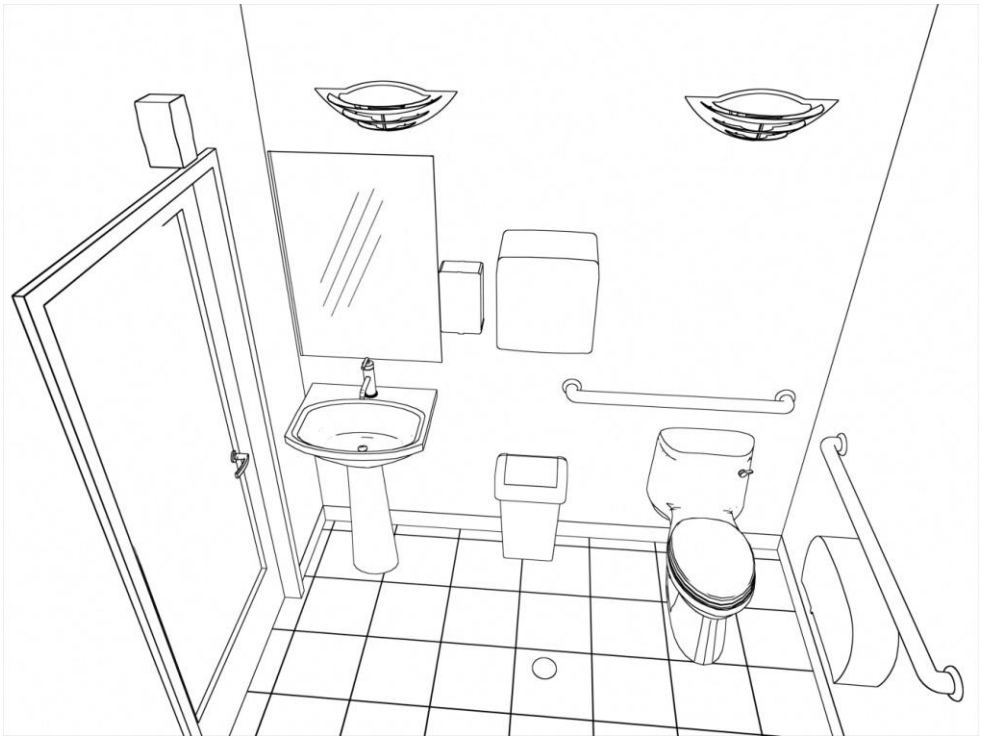
To verify that sanitizers were applied to appropriate surfaces, wet strips can be placed on appropriate target surfaces. Upon completion of sanitizer steps, the wet strips can be inspected for evidence of sanitizer application.

## Contact Times

Vital Technologies has published a contact time chart illustrating the approved kill times on various organisms. To view this chart, refer to Test Summary section of this manual. Vital Oxide Diluted at 12:1 (no rinse required on food contact surface rating) allows a user to simply wet a surface and allow to air dry. The elapsed time necessary to air dry is sufficient to effectively sanitize a surface.

# Guidelines for Daycare Facilities, Schools and Universities

Academic institutions routinely encounter a diverse population of students and potential worldwide range of disease transmission.



## Terms Used [8]

"Porous Surface"
"Semi-Porous Surface"
"Non- Porous Surface"
"Cleaning"
"Disinfection"
"Sanitizing"

[8] See full description in definition section

## Recommended Equipment

- Microfiber cloths
- Proportioner
- Test Kits
- Sprayers and foggers
- Need in non-ventilated confined spaces.
- (1) 3M half face reusable respirator with 3m model # (6002) chlorine dioxide cartridge
- (2) Eye Protection goggles

## Dilutions

Vital Oxide comes in a full strength formula Ready To Use (RTU) and can be diluted down. Automatic mixing units can be truck mounted or mounted at your home. Vital Oxide is formulated Ready To Use (RTU) full strength USEPA Hospital Disinfectant for non-porous surfaces.

- 5:1 dilution, Vital Oxide is used as Fabric and Carpet Sanitizer. First test for color Fastness in an inconspicuous space. Do not used on wool fabrics.
- 12:1 dilution, Vital Oxide is used as a no rinse required non-porous and food surface contact surface sanitizer.

## Hot Spots/ Areas of Attention

- Elevators - Regularly clean and disinfect the buttons, doors, handrails and other surfaces frequently touched. An elevator is a mold, bacteria and germ delivery device. Inside the elevator shaft, the environment is the perfect breeding ground for mold, germs and bacteria; a dark, dank, warm climate where moisture can accumulate on the floor. The elevator acts as a plunger forcing this contaminated air into the elevator and onto the floors.
- Escalators (especially hand rails)
- Building entrances
- Door knobs/handles
- Security locks and buttons
- Intercom systems
- Chairs and other resting areas
- Lobby and reception counters
- Hand rails in staircases

## Daycare Facilities

In daycare settings, playpens should be cleaned and disinfected daily (after hours when children are not present). Spray playpens and use microfiber wipes using a 12:1 dilution of Vital Oxide. Let stand for 10 minutes. Wipe treated surfaces so that they remain visibly wet for 30 seconds, then air dry. In daycare settings, mouthed toys should be cleaned and disinfected frequently using microfiber wipes and a 12:1 dilution of Vital Oxide. After wiping toys with Vital Oxide, allow to air dry.

To clean hard floor surfaces, damp-mop using a 12:1 dilution of Vital Oxide. Allow standing for 10 minutes, then rinse and dry. Use a two-bucket method with separate wash and rinse microfiber mop heads in each bucket.

To prevent cross contamination wear disposable gloves when cleaning with 12:1 dilution of Vital Oxide and when cleaning surfaces contaminated by bodily secretions. Properly dispose of gloves after cleaning each guest room. If cleaning involves contact with body fluids, properly dispose of gloves immediately.

## To Deodorize

Vital Oxide works by oxidation, not by masking of odors. Eliminates odors caused by fire smoke, tobacco smoke, musty odors, stale-cooking odors. Simply spray at the droplet size level (large drops or fine mist) or wipe on full strength and let air dry to provide long lasting residual deodorizing action. When spraying, apply 1 quart per 2000 cubic ft. following sprayer manufacturer's directions for use keeping in mind the droplet size required for the appropriate application. Vital Oxide must come into contact with the cause of the odor to be effective. For pet urine stains in carpet, blot urine as dry as possible then saturate stain with Vital Oxide through carpet pad.

### Restroom Cleaning

Thoroughly clean restrooms based on usage. In high-traffic areas, restrooms should be cleaned more often than in office situations where the traffic load is less. Visual inspection of facilities provides input into the proper frequency of cleaning events. Ensure that cleaning staff members have easy access to cleaning plans, product labels, MSDS's and method cards. Use the appropriate cleaner, sanitizer and/or disinfectant diluted according to the label instructions. Do not mix Vital Oxide with vinegar or acidic cleaners.[9]

### Contact Times

Vital Technologies has published a contact time chart illustrating the approved kill times on various organisms. To view this chart, refer to Test summary section of manual. Vital Oxide Diluted at 12:1 (no rinse required on food contact surface rating) allows a user to simply wet a surface and allow to air dry. The elapsed time necessary to air dry is sufficient to effectively sanitize a surface.

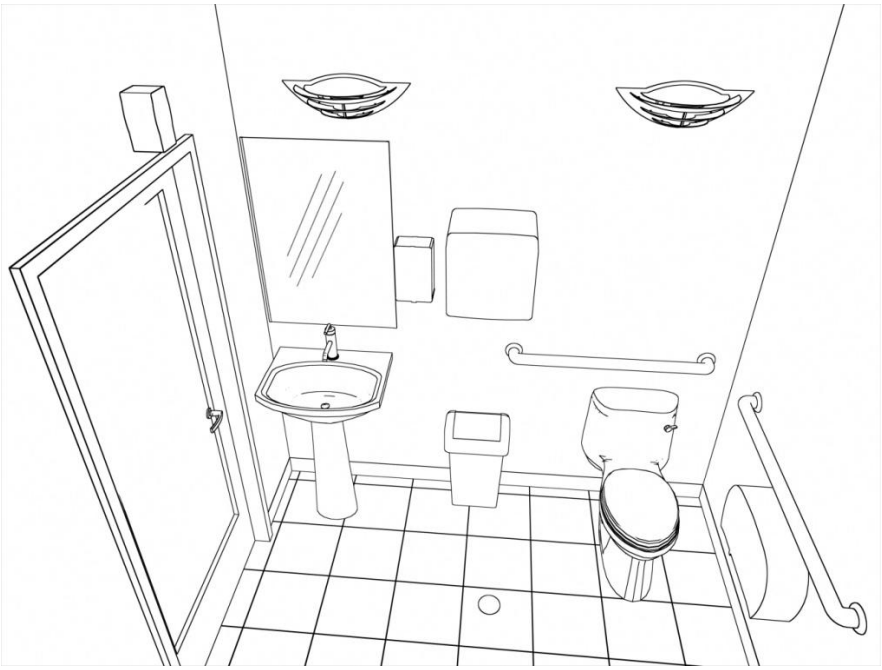
### Monitoring

Employees will visually and physically inspect surfaces and equipment to ensure that the surfaces are clean.

9 Note:Food preparation and service areas in these facilities please reference Guidelines for Sanitization of Food Preparation Areas

# Guidelines for Commercial and Residential Contract Cleaners

Facility managers and building service contractors can work together to implement effective cleaning, sanitization and disinfection programs that improve indoor air quality, reduce costs, reduce environmental impacts and help stem the spread of illness within buildings and communities.



### Terms Used [10]

"Porous Surface"

"Semi-Porous Surface"

"Non- Porous Surface"

"Cleaning"

"Disinfection"

"Sanitizing"

[10] See full description in definition section

## Recommended Equipment

- Microfiber cloths
- Proportioner
- Test Kits
- Sprayers and foggers
- Need in non-ventilated confined spaces
- (1) 3M half face reusable respirator with 3M model# (6002) chlorine dioxide cartridge
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## Dilutions

Vital Oxide comes in a full strength formula Ready To Use (RTU) and can be diluted down. Automatic mixing units can be truck mounted or mounted at your home. Vital Oxide is formulated Ready To Use (RTU) full strength USEPA Hospital Disinfectant for non-porous surfaces.

- 5:1 dilution, Vital Oxide is used as Fabric and Carpet Sanitizer. First test for color Fastness in an inconspicuous space. Do not used on wool fabrics.
- 12:1 dilution, Vital Oxide is used as a no rinse required non-porous and food surface contact surface sanitizer.

## Hot Spots/ Area of Attention

- *Drop Ceiling Tiles* - Use Vital Oxide in a 5:1 dilution in a fogger or fine mist sprayer after micro-cleaning ceiling tiles to provide the best cleaning and disinfection method.

- *Carpet Sanitizing* - Carpets, by design, are soil and organic matter magnets. The tight knit fibers make carpets difficult to keep clean and microorganisms, allergens and debris builds up in carpets. Typical cleaning methods include HEPA vacuuming, liquid application and suction removal and steam liquid application and suction removal. Vital Oxide is a registered Carpet Sanitizer.15 Carpets can be sanitized and deodorized using Vital Oxide in a time saving simple step.

- Vital Oxide works by oxidation to eliminate odors. Simply spray, fog or wipe on and allow to air dry to provide long lasting residual deodorizing action. Vital Oxide must come into contact with the cause of the odor to be effective. Vital Oxide is great for synthetic carpet fibers such as nylon, olefin or polypropylene - not intended for use on animal fibers such as wool carpet. Test for color fastness in an inconspicuous area. Carpet should be clean and free of excessive soil before applying. Apply by sprayer at a rate of approx. 22 oz. per sq. yd. Vital Oxide must come onto contact with contaminant to work. Allow to dwell for 10 min. Do not rinse, use extraction wand and dry stroke carpet to remove excess moisture. Carpet can air dry or fans may be used in order to dry carpet faster.

- *Floors* - Floors may be cleaned using a full strength 12:1 or 5:1 dilution based on dirt load levels and disinfected using the full strength solution, dependent upon the cleaning criteria and objectives.

- *Walls* - Walls may be cleaned, sanitized or disinfected using the appropriate dilution. Microfiber cloths and mops have been evaluated and shown to attract and hold smaller diameter particles than cotton mops, single use mop heads eliminate cross contamination, reduction in water usage and use and exposure to disinfectant chemicals, microfiber mopping is more ergonomic.

- *Frequently touched surfaces* - Regularly clean and/or disinfect surfaces that are frequently touched. These include doorknobs and door push plates, light switches, handrails, elevator buttons and panels, telephones, toilet flush handles, computer keyboards, alarm controls, door bells, countertops and desks, and drawer handles and knobs, to name a few. Use RTU Vital Oxide cleaner and disinfectant on these surfaces.

### Residential and Commercial Touch Points Include

Ceiling, Ceiling Fans, Vents, Ceiling lights, Walls-top to bottom, artwork, trim collection areas, Kickboards, Door Handles, Cabinet Handles, Light Switches, Telephones, Computer/Calculator Keyboards, Copier touch pads, Writing Utensils, drinking water dispenser switches, office machine touch pads, vehicle steering wheels, handles and dashboard switches, Appliance Handles, Shelves, books, objects, Dressers, Closets, Electronic Equipment and desks.

## Hot Spots/ Area of Attention

- Elevators - Regularly clean and disinfect the buttons, doors, handrails and other surfaces frequently touched. An elevator is a mold, bacteria and germ delivery device. Inside the elevator shaft, the environment is the perfect breeding ground for mold, germs and bacteria; a dark, dank, warm climate where moisture can accumulate on the floor. The elevator acts as a plunger forcing this contaminated air into the elevator and onto the floors.

## To Deodorize

Vital Oxide works by oxidation, not by masking of odors. Eliminates odors caused by fire smoke, tobacco smoke, musty odors, stale-cooking odors. Simply spray at the droplet size level (large drops or fine mist) or wipe on full strength and let air dry to provide long lasting residual deodorizing action. When spraying, apply 1 quart per 2000 cubic ft. following sprayer manufacturer's directions for use keeping in mind the droplet size required for the appropriate application. Vital Oxide must come into contact with the cause of the odor to be effective. For pet urine stains in carpet, blot urine as dry as possible then saturate stain with VITAL OXIDE through carpet pad.

## Restroom Cleaning

Thoroughly clean restrooms based on usage. In high-traffic areas such as retail stores and common areas of lodging facilities, restrooms should be cleaned more often than in office situations where the traffic load is less. Visual inspection of facilities provides input into the proper frequency of cleaning events. Ensure that cleaning staff members have easy access to cleaning plans, product labels, MSDS's and method cards. Use the appropriate cleaner, sanitizer and/or disinfectant diluted according to the label instructions. Do not mix Vital Oxide with vinegar or acidic cleaners.

Use appropriate mopping methods to reduce the spread of contamination in your facility. Dedicated mop head cleaning using microfiber mops – the most hygienic mopping method. Prepare Vital Oxide cleaning solution at full strength for heavily soiled areas, body fluids, black water releases and moldy/mildew surfaces. The goal is to remove all organic matter.

- Place clean/sterile microfiber mop heads in the solution.
- The mop heads can be color coded for separate rooms.

- After removal of gross dirt and organic material, use a wet mop head to clean ceilings, floors and/or walls. Work your way out of the area to minimize cross contamination.
- Change mop heads periodically based on square feet cleaned. One mop head generally cleans an 8x8 to 12x12 foot area.
- Place used mop head in plastic bag for transport to cleaning area.
- Replace mop with a fresh mop head form the solution bucket.
- To prevent the spread of contamination, sponges, mops, cleaning cloths and the like must be washed between cleaning tasks and allowed to dry thoroughly.

## Uniforms and cleaning tools

- Ensure daily washing of clothing, microfiber cloths, microfiber mops, microfiber towels and other linens, with a minimum of agitation and shaking.
- Bag all textiles at the collection site and transport them in a closed laundry bag.
- Machine-wash all kitchen and restaurant laundry.
- Follow local hygiene rules and use appropriate products at the appropriate concentrations to reduce the risk of spreading contaminants.
- Use appropriate personal hygiene practices like, hand washing, loose hair control, cross-contamination from other work areas, etc.

## Wiping Methods

- Prepare vital oxide-cleaning solution at full strength for heavily soiled areas, body fluids; gray or black water releases and moldy/mildew surfaces. The goal is to remove all organic matter.
- Place clean/sterile microfiber washcloths in the solution.
- The washcloths can be color coded for separate areas/rooms.
- After removal of gross dirt and organic material, use a washcloth to clean/sanitize/disinfect ceilings, floors and/or walls. Work your way out of the area to minimize cross contamination.
- Change washcloths periodically based on square feet cleaned. One 1x1 foot washcloth generally cleans a 6x6 foot surface area.
- Place used washcloths in plastic bag for transport to cleaning area.
- Replace washcloths with a fresh mop head from the solution bucket.
- To prevent the spread of contamination, sponges, mops, cleaning cloths and the like must be washed between cleaning tasks and allowed to dry thoroughly.

### Monitoring

Based on the amount of dirt, grime and dust accumulates. The frequency of general cleaning can be adjusted from daily to weekly to monthly. Sanitizing and disinfection procedure frequency is based on regulatory requirements for the application at hand, i.e. food service or healthcare type applications.

# Literature Cited


1.Biology of Microorganisms, Brock, 11th Ed., Madigan, Martinko,Pearson, Prentice-Hall, 2006.

2.National Institutes of Health: www4.ncbi.nlm.nih.gov/genomes/SARS/SARS.html

3.http://www.lenntech.com/processes/disinfection/chemical/disinfectants-chlorine-dioxide.htm#ixzz0xRAJZi2j

4.Kirk-Othmer, Encyclopedia of Chemical Technology.

5. U.S. Centers for Disease Control and Prevention: www.cdc.gov.

6.Fact sheet FS15, one of a series of the Food Science and Human Nutrition Department., Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida. Publication: June 1997. Reviewed: April 2008. Please visit the EDIS Website at http://edis.ifas.ufl.edu.

7.Ronald H. Schmidt, Ph. D., professor and food science extension specialist, Food Science and Human Nutrition Dept., Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida, Gainesville, 32611.

8.Sustainable Hospitals Project, U of Mass Lowell, Case Study: Are microfiber Mops Beneficial for Hospitals? www.sustainablehospitals.org.

9.USEPA, Using Microfiber Mops in Hospitals: http://www.epa.gov/region9/waste/p2/projects/hospital/mops.pdf.

10.CDC, Atlanta, GA, http://www.cdc.gov/ncidod/dbmd/diseaseinfo/foodborneinfections_g.htm

11.OXYCHEM, Treatment of Biofilms with Chlorine Dioxide http://www.oxy.com/Our_Businesses/chemicals/Documents/sodium_chlorite/technicalData/Treatment%20of%20Biofilms%20with%20Chlorine%20Dioxide.pdf

12.Effectiveness of Vital Oxide for Controlling Fungal Contamination on Building Materials, Estelle Levetin, PhD Faculty of Biological Science, The University of Tulsa

13.DIS/TSS-8 Efficacy Data: Requirements for Carpet Sanitizers

14.An Intervention to Reduce the Rate of Hospital-Acquired Acinetobacter Infections in an Urban Community Teaching Hospital, Robert B. Hulette, Infection Control and patient Safety Officer, Nashville General Hospital at Meharry

15.Vital Oxide Material Safety data Sheet

16.Vital Oxide test Summary

17.Vital Oxide Label

# APPENDIX

# Chlorine Dioxide FAQs

## Q. What Makes Chlorine Dioxide ($ClO_2$) Different from Chlorine?

A. While chlorine dioxide ($CLO_2$) has “chlorine” in its name, its chemistry is radically different from that of chlorine. As we all learned in high school chemistry, we can mix two compounds and create a third that bears little resemblance to its parents. For instance, by mixing two parts of hydrogen gas with one of oxygen - liquid water is the formed. We should not be misled by the fact that chlorine and chlorine dioxide share a word in common. The chemistries of the two compounds are completely different.

Chlorine dioxide is generally accepted to be more powerful, easier to use, and more environmentally friendly than equivalent chlorine treatments. It is a more expensive treatment, but its superior environmental performance means that it is rapidly replacing chlorine in a number of applications.

Chlorine and chlorine dioxide are both oxidizing agents (electron receivers). However, chlorine has the capacity to take in two electrons, whereas chlorine dioxide can absorb five. This means that, mole for mole, $CLO_2$ is 2.5 times more effective than chlorine.

Of equal, if not greater importance is the fact that chlorine dioxide will not react with many organic compounds, and as a result $CLO_2$ does not produce environmentally dangerous chlorinated organics. For example; aromatic compounds have carbon atoms arranged in rings and they may have other atoms, such as chlorine, attached to these rings, to form a chlorinated aromatic - a highly toxic compound that persists in the environment long after it is produced.

Chlorine dioxide's behavior as an oxidizing agent is quite dissimilar. Instead of combining with the aromatic rings, chlorine dioxide breaks these rings apart. In addition, as the use of chlorine dioxide increases, the generation of chlorinated organics falls dramatically.

Chlorine dioxide is an oxidizing biocide and not a metabolic toxin. This means that chlorine dioxide kills microorganisms by disruption of the transport of nutrients across the cell wall, not by disruption of a metabolic process.

Of the oxidizing biocides, chlorine dioxide is the most selective oxidant. Both ozone and chlorine are much more reactive than chlorine dioxide, and they will be consumed by most organic compounds. Chlorine dioxide however, reacts only with reduced sulfur compounds, secondary and tertiary amines, and some other highly reduced and reactive organics. This allows much lower dosages of chlorine dioxide to achieve a more stable residual than either chlorine or ozone.

The efficacy of chlorine dioxide is at least as high as chlorines, though at lower concentrations. But there are more and important advantages:

1. The bactericidal efficiency is relatively unaffected by pH values between 4 and 10.

2. Chlorine dioxide is clearly superior to chlorine in the destruction of spores, bacteria's, viruses and other pathogen organisms on an equal residual base.

3. The required contact time for $CLO_2$ is lower.

4. Chlorine dioxide has better solubility.

5. $CLO_2$ does not produce the corrosion associated with high chlorine concentrations. This significantly reduces long-term maintenance costs.

6. Chlorine dioxide does not react with NH3 or NH4+.

7. It destroys THM precursors and increases coagulation.

8. $CLO_2$ destroys phenols and has no distinct smell.

9. It is better at removing iron and magnesia compounds than chlorine, especially complex bounds.

10. It has been proven beyond doubt that chlorine dioxide removes biofilm from water systems and prevents it from forming when dosed at a continuous low level. Hypochlorite on the other hand has been proven to have little effect on biofilms.

## Q. How does chlorine dioxide disinfect?

A. Chlorine dioxide disinfects through oxidation. It is the only biocide that is a molecular free radical. Chlorine dioxide only reacts with substances that give off an electron. Chlorine, oppositely, adds a chlorine atom to or substitutes a chlorine atom from the substance it reacts with.

Substances of organic nature in bacterial cells react with chlorine dioxide, causing several cellular processes to be interrupted. Chlorine dioxide reacts directly with amino acids and the RNA in the cell. It is not clear whether chlorine dioxide attacks the cell structure or the acids inside the cell. The production of proteins is prevented. Chlorine dioxide affects the cell membrane by changing membrane proteins and fats and by prevention of inhalation.

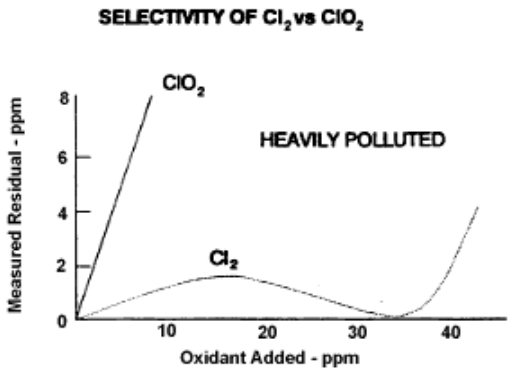
When bacteria are eliminated, the cell wall is penetrated by chlorine dioxide. Viruses are eliminated in a different way; chlorine dioxide reacts with peptone, a water-soluble substance that originates from hydrolysis of proteins to amino acids. Chlorine dioxide kills viruses by prevention of protein formation. Chlorine dioxide is more effective against viruses than chlorine or ozone.

The predominant oxidation reaction mechanism for chlorine dioxide (and for ozone as well) proceeds through a process known as free radical electrophilic (i.e. electron-attracting) abstraction rather than by oxidative substitution or addition (as in chlorinating agents such as chlorine or hypochlorite).

It has this ability due to unique one-electron exchange mechanisms. One electron is transferred and chlorine dioxide is reduced to chlorite ($ClO_2$-).

## Chlorine dioxide as a highly selective oxidizer

As an oxidizer chlorine dioxide is very selective. It has this ability due to unique one-electron exchange mechanisms. Chlorine dioxide attacks the electron-rich centers of organic molecules. One electron is transferred and chlorine dioxide is reduced to chlorite ($CLO_2^-$).




Chlorine dioxide is more selective as an oxidizer than chlorine. While dosing the same concentrations, the residual concentration of chlorine dioxide is much higher with heavy pollution than the residual concentration of chlorine.

By comparing the oxidation strength and oxidation capacity of different disinfectants, one can conclude that chlorine dioxide is effective at low concentrations. Chlorine dioxide is not as reactive as ozone or chlorine and it only reacts with sulfuric substances, amines and some other reactive organic substances. In comparison to chlorine and ozone, less chlorine dioxide is required to obtain an active residual disinfectant. It can also be used when a large amount of organic matter is present.

The oxidation strength describes how strongly an oxidizer reacts with an oxidizable substance. Ozone has the highest oxidation strength and reacts with every substance that can be oxidized. Chlorine dioxide is weak, it has a lower potential than hypochlorous acid or hypobromous acid.

The oxidation capacity shows how many electrons are transferred at an oxidation or reduction reaction. The chlorine atom in chlorine dioxide has an oxidation number of +4. For this reason chlorine dioxide accepts 5 electrons when it is reduced to chloride.

The oxidation potentials of various oxidants:

| oxidant | oxidation strength | oxidation capacity |
|---|---|---|
| ozone ($O_3$) | 2,07 | 2 e- |
| hydrogen peroxide ($H_2O_2$) | 1,78 | 2 e- |
| hypochlorous acid (HOCl) | 1,49 | 2 e- |
| hypobromous acid (HOBr) | 1,33 | 2 e- |
| chlorine dioxide ($ClO_2$) | 0,95 | 5 e- |

The following comparisons show what happens when chlorine dioxide reacts. First, chlorine dioxide takes up an electron and reduces to chlorite:

$CLO_2 + e^- \rightarrow CLO_2^-$

The chlorite ion is oxidized and becomes a chloride ion:

$CLO_2^- + 4H^+ + 4e^- \rightarrow Cl^- + 2H_2O$

These comparisons suggest that chlorine dioxide is reduced to chloride, and that during this reaction it accepts 5 electrons. The chlorine atom remains, until stable chloride is formed. This explains why no chlorinated substances are formed. When chlorine reacts it does not only accept electrons; it also takes part in addition and substitution reactions. During these reactions, one or more chlorine atoms are added to the foreign substance (chlorination).

Does chlorine dioxide oxidize in the same way as chlorine?

Contrary to chlorine, chlorine dioxide does not react with ammonia nitrogen (NH3) and hardly reacts with elementary amines. It does oxidize nitrite (N02) to nitrate (NO3). It does not react by breaking carbon connections. No mineralization of organic substances takes place. At neutral pH or at high pH values, sulfuric acid (H2SO3) reduces chlorine dioxide to chlorite ions ($CLO_2^-$). Under alkalic circumstances chlorine dioxide is broken down to chlorite and chlorate (ClO3-) :

$2\ CLO_2 + 2OH^- = H_2O + ClO_3^- + CLO_2^-$

This reaction is catalyzed by hydrogen (H+) ions. The half life of watery solutions of chlorine dioxide decreases at increasing pH values. At low pH, chlorine dioxide is reduced to chloride ions (Cl- ).

When bacteria are eliminated, the cell wall is penetrated by chlorine dioxide. Organic substances within cells and on the surface of cell membranes react with chlorine dioxide, causing cell metabolism to be disrupted. Chlorine dioxide also reacts directly with amino acids and the RNA in the cell. This reaction is not dependent on reaction time or concentration. Unlike non-oxidizing disinfectants, chlorine dioxide kills microorganisms even when they are inactive. Microorganisms are unable to build up resistance to chlorine dioxide.

In practical terms however, few bacteria live alone, and they are most often found in water and on surfaces in the form of a “biofilm” which is a close association of many millions of bacteria. Many biocides have particular problems in penetrating this biofilm, due to the polysaccharide “glue” that is secreted by the bacteria to hold the biofilm together. Unlike most biocides, chlorine dioxide can effectively penetrate biofilm to provide complete protection.

## CHEMICAL OXIDATION BY $ClO_2$

$CLO_2$ possesses a chemical reactivity that differs markedly from other oxidants (Such as chlorine). Commercial applications have shown that chlorine dioxide can effectively oxidize many compounds considered to be waste and water pollutants. The table below lists a number of pollutants found in various industries and demonstrates the wide range of possible applications for the product.

Chlorine dioxide has been shown to be an effective treatment for the following pollutants:

- SULPHIDES ALDEHYDES
- REDUCED SULPHUR COMPOUNDS
- NITROGEN COMPOUNDS
- CYANIDES
- PHENOLS
- ALDEHYDES
- AMINES & MERCAPTANS
- THM PRECURSORS
- PESTICIDES
- ALGAE / SLIME
- METALS

## ALDEHYDES

Aldehydes are produced by a number of common industrial processes. Their treatment is a common problem, especially so in the photographic industry. In general, $CLO_2$ can oxidize an aldehyde to its corresponding carboxylic acid. Formaldehyde is a major component in the formulations used in photo processing. Chlorine Dioxide oxidizes formaldehyde to formic acid and finally to carbon dioxide. Para formaldehyde can be depolymerised and eliminated completely by oxidation with chlorine dioxide.

## AMINES AND MERCAPTANS

The major sources of odorous substances such as mercaptans and substituted amines include the chemical and petroleum industries, cooking and sanitary processes, animal feedlots and rendering plants.

Between pH 5 & 9, 4.5 parts by weight of chlorine dioxide instantaneously oxidizes 1 part by weight of mercaptan (expressed as sulfur) to the respective sulfonic acid or sulfonate compound, thus destroying the mercaptan odor. Similarly, chlorine dioxide reacts with organic sulfides and disulfides destroying the original odor.

Secondary and tertiary amines are also present in many wastewaters, causing their own unique odor problems. The oxidation of amines with chlorine dioxide depends on the pH of the reaction mixture and the degree of substitution of the amine.

Between pH 5 and 9, an average of 10 parts by weight of chlorine dioxide oxidizes 1 part by weight of a secondary aliphatic amine (expressed as nitrogen) removing all traces of amine odor. The higher the pH of the reaction mixture (chlorine dioxide and tertiary and/or secondary aliphatic amines) the more rapidly oxidation proceeds.

## THM PRECURSORS

The key to understanding why chlorine dioxide is so effective can be found in the differences in the reactions of chlorine dioxide and chlorine with Tri-halomethane (THM) precursors such as humic and fulvic acids.

Chlorine reacts with THM precursors by oxidation and electrophilic substitution to yield both volatile and non-volatile chlorinated organic substances (THMs).

Chlorine dioxide, however reacts with THM precursors primarily by oxidation to make them non-reactive or unavailable for THM production. This means that pre-treatment with chlorine dioxide has an inhibiting effect on THM formation when chlorine is subsequently used.

## PESTICIDES

Some pesticides can be oxidized to less toxic materials by chlorine dioxide. Specifically, Methylchlor (DMDT) and Adrian react with $CLO_2$. With parathion, the reaction is slow near to pH 7; however, when pH is above 8, less biodegradable herbicides such as paraquat and diquat are eliminated within a few minutes.

## ALGAE/SLIME

Chlorine dioxide has been sown to be effective in controlling algae growth. In one study, chlorine dioxide was found to be more effective than copper sulfate, at comparable treatment costs. Chlorine dioxide is believed to attach the pyrolle ring of the chlorophyll. This cleaves the ring and leaves the chlorophyll inactive. Since algae cannot function without chlorophyll metabolism, they are destroyed. The reaction of chlorine dioxide with algae and their essential oils forms tasteless, odorless substances.

Algae control is carried out by adding chlorine dioxide to the reservoir at night (To prevent photolytic decomposition of $CLO_2$) The algae killing action is fast enough to be effective before the sun rises. A dosage of 1 mg/litre has been reported to control algae populations

## SULFIDES

Many industrial processes produce sulfide-containing gases and waste products. These are generated, for example, during petroleum refining, coal coking, black liquor evaporation in kraft pulping, viscose rayon manufacture and natural gas purification. These gases and wastes are frequently scrubbed with alkaline solutions and require treatment before discharge.

Between pH 5 and 9, an average of 5.2 parts by weight of chlorine dioxide instantaneously oxidizes 1 part by weight of hydrogen sulfide (expressed as sulfide ion) to the sulfate ion.

## NITROGEN COMPOUNDS

Nitrogen oxides are dangerous and corrosive. Nitrous Oxide (NO) and nitrogen dioxide (NO2) are industrial effluents that result from fuel combustion, nitric acid manufacture and use, and from metal finishing operations, which use nitrates, nitrites or nitric acid. Other sources include chemical processes in which nitrogen compounds are used as reagents. Chlorine dioxide has been used to scrub these contaminants. Nitric oxide contained in gas discharges from coke kilns may be eliminated by oxidation by chlorine dioxide. This process is particularly convenient for continuous operation.

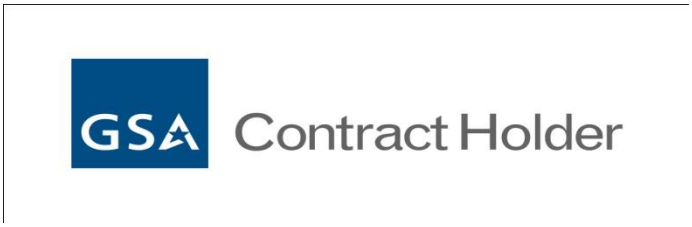
## CYANIDES

Cyanide compounds originate from processes such as metal plating, steel case hardening, pickle liquor neutralizing, gold and silver ore refining and blast furnace stack gas scrubbing. Chlorine dioxide oxidizes simple cyanide to cyanate (a less toxic substance) and/or carbon dioxide and nitrogen. The end products depend on reaction conditions.

In neutral and alkaline solutions below pH 10, an average of 2.5 parts by weight of chlorine dioxide oxidizes 1 part by weight of cyanide ion to cyanate. Above pH 10, an average of 5.5 parts by weight of chlorine dioxide oxidizes 1 part by weight of cyanide ion to carbon dioxide and nitrogen. Chlorine dioxide does not react with cyanate ion, nor has it been observed to form cyanogen chloride during the oxidation of cyanide. Chlorine dioxide also oxidizes thiocyanate to sulfate and cyanate. In neutral solutions, an average of 3.5 parts by weight of chlorine dioxide oxidizes 1 part by weight of thiocyanate ion.

# GSA Information

## GSA Price List




**Contact Information**

Online access to contract ordering information, terms and conditions, up to-date pricing, and to create an electronic delivery order is available through GSA Advantage! a menu driven database system. The internet address for GSA Advantage! is: http://gsaadvantage.gov

Contract Number: GS-07f-0474W
Contract Period: June 15, 2010 – June 15 2015
Federal Supply Schedule: 73 Food Service, Hospitality, Cleaning, Equipment & Supplies, Chemical& Service
Contractor:
Vital Technologies Inc,
7830 Byron Drive Suite 12
West Palm Beach FL 33404
Website: www.vitaltechnologies.com
Email: gsa@vitaltechnologies.com
Sales, Information and Billing 561-848-1717
Business Size: Small

**Customer Information**

1a. Table of Award Special Item Numbers (SINs)

| SIN | Description |
|---|---|
| 375-362 | Cleaner/Degreaser |
| 476-13 | Disinfectants |

1b. Lowest Priced Model Number and Price for this SIN:

| SIN | Model & Item Number | Price |
|---|---|---|
| 375-362 | Anti Allergen Solution 3oz | $7.45 |
| 476-13 | Vital Oxide Hospital Disinfectant 3oz | $7.45 |

1c. Hourly Rate: N/A

2. Maximum Order:
$125,000.00 per SIN 375-362
$150,000.00 per SIN 375-362

If the best value selection places your order over the Maximum Order identified in this catalog/price list, you have an opportunity to obtain a better schedule contract price. Before placing your order, contact the aforementioned contactor for a better price. The contractor may (1) offer a new price for this requirement (2) offer the lowest price available under the schedule contract in accordance with FAR 8.404.

3. Minimum Order: $100.00
4. Geographic Coverage: 48 Contiguous States, Puerto Rico, Hawaii
5. Points(s) of Production: U.S.A.
6. Discount from List Price: 7%
7. Quantity Discount; 3% on order over $3,000.00
8. Prompt Payment Terms: Net 30 Days

9a. Government Purchase Cards are accepted at the micro or below the micro- purchase threshold

9b. Government Purchase Cards are accepted above the micro –purchase threshold.

10. Foreign Items: None

11a. Time of Delivery: 30 DARO

11b. Expedited Delivery: 14 DARO (Working Days)

11c. Overnight and 2 Day Delivery: See Above

11d. Urgent Requirements: Agencies can contact Vital Technologies Inc, to affect a faster delivery. Customers are encouraged to contact Vital Technologies Inc, for the purpose of requesting accelerated delivery.

12. FOB Point: Origin

13a. Ordering Address:

Vital Technologies Inc, 7830 Byron Drive Suite 12
West Palm Beach FL, 33404

13b. Ordering Procedures: For suppliers and services, the ordering procedures, information on Blanket Purchase Agreements (BPA's) are found in Federal Acquisition Regulation (FAR) 8.405-3

14. Payment Address: Same as ordering address
15. Warranty Provision: Standard Commercial Warranty. Cost plus 5% restocking Fee applies
16. Export Packing Charges: N/A
17. Terms and Conditions of Government Purchase Card Acceptance: None
18. Special Attributes Such as Environmental Attributes: (e.g. recycled content, energy efficiency, and or reduced pollutants): Contact Vital Technologies Inc,
19. Section 508 Compliance for EIT: N/A
20. Data Universal Number System (DUNS) Number: 196877299
21. Notification Regarding Registration in Central Contractor Registration (CCR) Database: Registration valid until 4/9/2011

# Shipping and Sizes

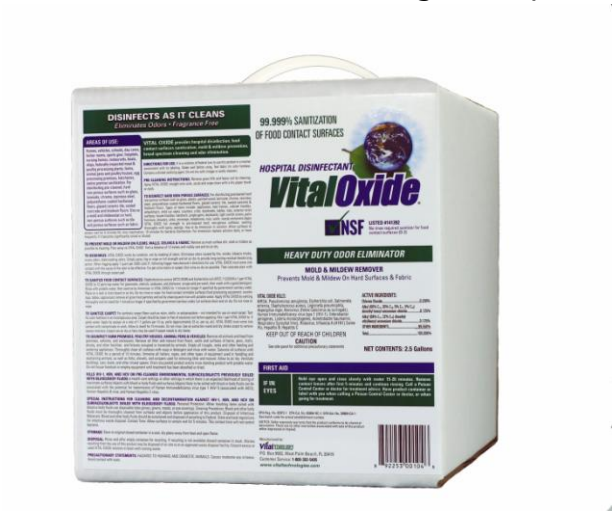
# Shipping Specifications

| ITEM # | SIZE | QTY | ETIN | WEIGHT | SIZE | PALLET ASSEMBLY |
|---|---|---|---|---|---|---|
| 9128 | 128 OZ | 4 Items/case 36 Cases/pallet | Case 10892253001005 Pallet 20892253001002 | Case=36 lbs<br>Pallet= 1278 lbs | Case=12”x12”x12”<br>Pallet=48”x42”x56” | 4 Tiers<br>9 Cases/Tier |
| 9032 | 32 oz | 6 Items/case 72 cases/pallet | Case 10892253001012 Pallet 20892253001019 | Case=14 lbs<br>Pallet=1030 lbs | Case=16”x6”x12”<br>Pallet=48”x42”x52” | 4 Tiers<br>18 Cases/Tier |
| 9003 | 3 oz | 24 items/case 40 cases/pallet | Case 10892253001029 Pallet 20892253001026 | Case=7 lbs<br>Pallet=280 lbs | Case=10”x8”x7”<br>Pallet=48”x42”x22” | 2 Tiers<br>20 Cases/Tier |
| 9250 | 2.5 Gal BIB | 64 BIB’s/Pallet | Unit 892253001046 Pallet 20892253001040 | BIB=45 lbs<br>Pallet=1440 lbs | BIB=10”x10”x10”<br>Pallet=48”x42”x41” | 4 Tiers<br>16 Cases/Tier |
| 9500 | 5 Gal BIB | 36 BIB’s/Pallet | Unit 892253001053 Pallet 20892253001057 | BIB=45 lbs<br>Pallet=1620 lbs | BIB=12”x12”x12”<br>Pallet=48”x42”x52” | 2 Tiers<br>18 Cases/Tier |
| 9550 | 55 Gal Drum | 1 Drum per Pallet | (call) | 1 Drum=499 lbs | Pallet=42”x48”x38” | 1 Tier |
| 9550 | 55 Gal Drum | 4 Drums per pallet | (call) | 4 Drums= 1996 lbs | Pallet=42”x48”x38” | 1 Tier |
| 9275 | 275 Gal Tote | 1 Tote per Pallet | (call) | 1 Tote=2350 lbs | Pallet=42”x48”x52” | 1 Tier |

# Equipment, Use, Safety

## Bag-in-a-Box

The Vital Oxide Bag-in-a-Box (BIB) is convenient eco-sustainable packaging designed to reduce packaging waste, transportation cost, and storage space. This dual-purpose packaging design consists of heavy a duty cardboard box and strong leak resistant bladder equipped with an on/off valve. The unique closed-loop valve allows for either a free pour directly into application equipment, or connection to the Vital Technologies Proportioner.




The Ecologically Smart Choice

- The eco-advantage starts with manufacturing. Far less material, much which comes from recycled sources, is used in the manufacturing process.
- Transportation cost and fuel savings are realized when we purchase from our supplier. 1 case of empty flex pouches and 1 pallet of recycled flat cardboard boxes takes the places of an entire truckload of ridged plastic containers.
- Shipping cost are also reduced to our customers, because more gallons of filled BIBs fit on each pallet.

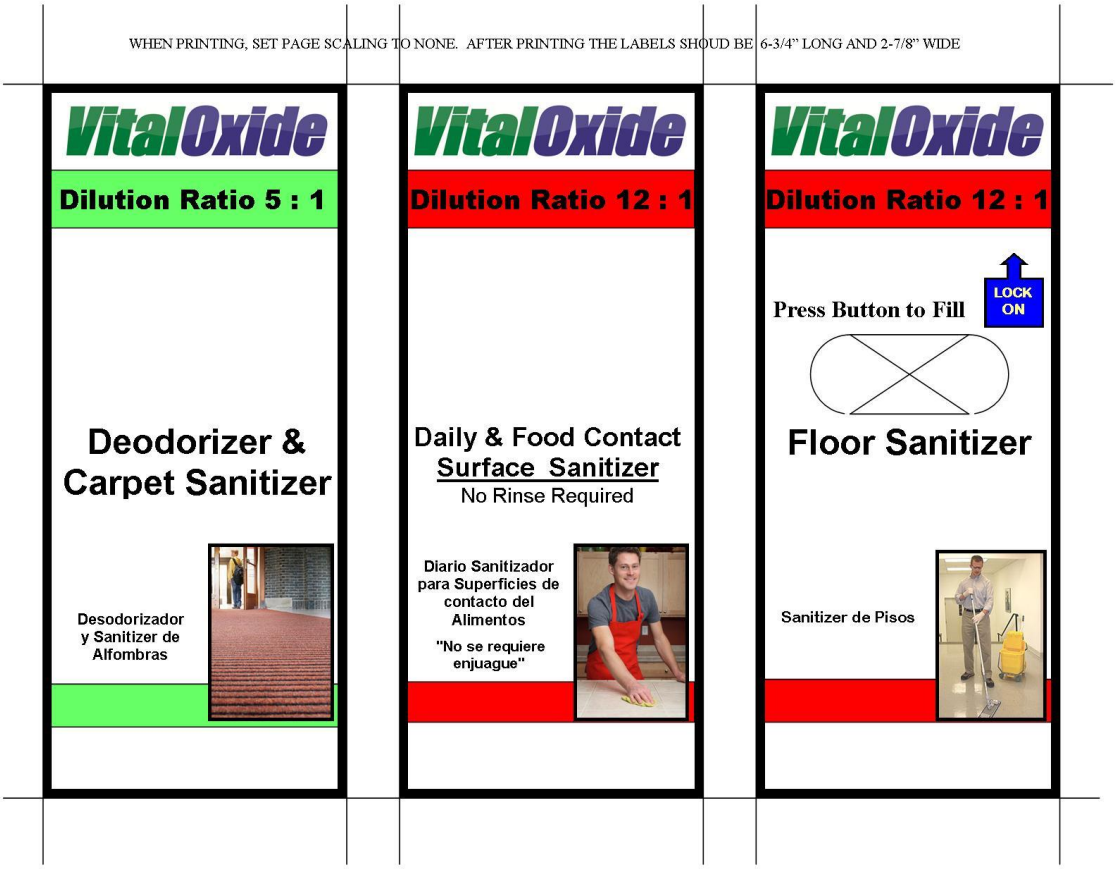
## Proportioner

The Vital Oxide Proportioner consists of three individual units, two units designed to easily fill spray bottles at a 5:1 deodorizer and Carpet Sanitizer and 12:1 Daily Sanitizer with no rinse required dilutions, the third is fitted with an attachment to fill a mop bucket or storage container at a 5:1 dilution.


- Reduced chemical waste and accurate dilutions are realized.
- One step installation, the proportioner unit comes
- pre-assembled, all you need to do is insert two screws into the wall.
- Closed loop system will prevent any possible contamination.

Comes with Instructional Placard in both English and Spanish

## Porportioner Inserts





## Labels for 32 oz spray bottles

# VitalOxide

Areas of use with
Vital Oxide Proportioner

Dilution Ratios

5:1

**Deodorizer & Carpet Sanitizer**

Desodorizador y Santizer de Alfombras

12:1

**Daily Sanitizer & Food Contact Surfaces NO RINSE REQUIRED**

Diario Sanitizador para Superficies de Alimentos "No se requiere enjuague"

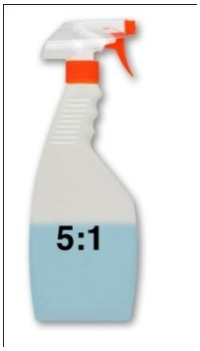
12:1

**Hard Surface and Floor Sanitizer**

Limpiador de Superficies Dura y Sanitizer de Pisos

## Areas of Use Dilution ratio

| | Problems | Use |
|---|---|---|
| **Vital Oxide Ready To Use** | Infection and Virus Control | Hospital Disinfectant |
| | | Vehicles |
| | | Nurseries |
| | | Schools and Universities |
| | | Athletic facilities |
| | Mold & Mildew Control | Commercial & Residential |
| | Pet stains | Farm Premises |
| | | Poultry House |
| | | Animal Pens |
| | | |
| | | |
| | | |
| **Vital Oxide Diluted 5 to 1** | Carpet and Fabric Sanitizer | Carpet and Fabric Sanitizer |
| | | |
| | | |
| | | |
| | | |
| **Vital Oxide Diluted 12 to 1** | Daily Sanitizing | Daily Sanitizer with no rinse required for food contact surfaces. |


## Vital Oxide Proportioner Installation Instructions

Step 1: Locate bag of mounting hardware. Bag should include (3) wall anchors, (3) screws, (3) washers and zip ties.

- An extra screw, anchor, and washer are provided. The proper proportioning tips have already been installed.

Step 2: Once desired mounting location is selected, hold black mounting board to the wall and, using a pencil, mark the location to drill holes at the top of the board. Using a 3/16" bit, drill holes where marked and insert wall anchors.

- Use caution to not bend or break anchor. A hammer may be used to tap the anchor into place.

Step 3: Place washers over screws. Align mounting board with wall anchors and thread screws all the way into wall.

Step 4: Connect black hose to water source.

Step 5: locate the long tube coming off the proportioning unit. Attached to the end of this tube is an adapter which fits onto the Vital Oxide Bag-In-Box (BIB).

Step 6: Select a dry location to store the BIB. Once the adapter is fitted onto the BIB, use the included zip ties to keep the tubing off the floor and to remove any slack from the line.

- Avoid placing the BIB above the proportioner as a siphoning effect may result.

Once fitted onto the Bag-In-Box and water source is connected, you may begin to use the proportioner.

## Instrucciones de Instalación

Primer Paso: Ubiaque la bolsa con la ferreteria de montaje.  La bolsa incluye (3) montura para la pared, (3) pernos, y (3) amaradores de plastico

Un perno, montadura de pared y arandela. Las puntas finale del propocionadore ya estanintalados.

Segundo Paso: Una vez que  deciden el lugar de montaje, aguante la tabla de montaje contra la pared y con un lapiz, marque la ubiacion del los huecos en la parte superior de la tabla.  Utilizando un talador de 3/16 pulgadas, haga las perforacion adonde estan las marcas e instale los anclas de pared.

Utilice precaucion de no doblar o romper la ancla.  Se puede utilizar un martillo para colocar la ancla en su lugar.

Tercer Paso: Coloque las arrandelas sobre los pernos.  Alinia la tabla de montura con las anclas y enrosca los pernos totalmente a la pared.

Cuarto Paso: Conecte la manguera negrea al fuente de agua.

Quinto Paso: Ubique el tubo largo (transparente) que se ecuentra en la unidad surtidora.  Coloque el adaptador,  que encaja en la bolsa de Vital Oxide (BIB),  al punto final de este tubo.

Sexto Paso: Escoge un lugar seco para almacenar el BIB.  Un vez que el adaptador esta contectado con el BIB, utilice los amardores de plastico para.

## Vital Oxide Test Kit

Vital Oxide in its original packaging (RTU) is an EPA registered hospital grade disinfectant. The full-strength RTU is formulated to tackle the toughest sanitization needs and is required when the highest level of disinfection is required. Certain applications, however, may allow for a lesser concentration of Vital Oxides active ingredient, stabilized chlorine dioxide ($CLO_2$). At the RTU concentration, the amount of $CLO_2$ in Vital Oxide is equal to 2000ppm.

The Vital Technologies research team in conjunction with the Environmental Protection Agency and NSF International has worked to determine the concentration at which Vital Oxide retains its unique disinfecting properties yet allows for the application of the product on food contact surfaces without the need to wipe the surface after application. Lab test results indicate that the RTU formula may be diluted with water at a 1:12 ratio, bringing the level of $CLO_2$ to 154ppm. This dilution of Vital Oxide is referred to as a food contact surface sanitizer. The EPA and NSF International have both confirmed the Vital Oxide Food Contact Surface Sanitizer to achieve a 99.999% sanitization at 154ppm $CLO_2$. NO RINSE.

The EPA has approved another concentration to be used as a carpet sanitizer and deodorizer. Research shows a 1:5 dilution, 333 ppm $CLO_2$, to effectively sanitize carpeting. As well as serving as a carper sanitizer, a 1:5 dilution is an excellent choice for odor removal. Depending on the source of the odor, a more aggressive concentration may be called for. Refer to your training and reference manual for additional information.

Your Vital Oxide proportioning system comes equipped ready to dispense Vital Oxide at both 1:12 and 1:5 dilutions, 154 ppm $CLO_2$ and 333ppm $CLO_2$ respectively. The proportioner is designed to function best at specified water pressures. More information on this is available in the section of the training and reference manual that talks about the specifications of the proportioning unit.

Certain things, such as inadequate water pressure may cause the proportioner to dispense Vital Oxide at concentrations that differ from those desired. Vital Technologies has assembled a Vital Oxide $CLO_2$ Test Kit to assist you in monitoring the performance of the proportioning unit over time. The kit consists of four bottles, a beaker, syringe and directions for use. Directions are included on the following page as well.

Federal, state or local law may mandate the frequency of which the proportioner must be tested to ensure proper dilutions are met. If, depending on the industry or facility where the unit is used, no specified requirements exist, it is still advised the unit be tested monthly. In the event that the target dilutions are not met, contact Vital Technologies, Inc.

**TK1181-Z** **green caps**

# Vital Oxide Test Kit

## 1 drop = 50 ppm $ClO_2$

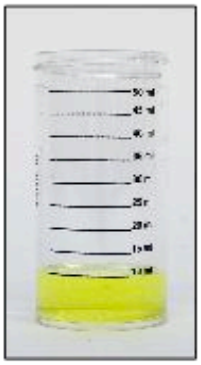
FOR BEST ACCURACY (1) ENSURE ACCURATE SAMPLE SIZE. (2) HOLD DROPPER BOTTLE VERTICALLY, NOT AT AN ANGLE.

1 Add 10 drops of Potassium Iodide 10% (PI1410) to test vial.

2 Add 10 drops of Citric Acid (CA3002) to test vial. Swirl to mix.

3 Use syringe to add 10 mL of the sample to test vial. Swirl to mix.

Yellow color indicates available $ClO_2$



4 Add 2 drops of Starch Indicator Solution (ST5005) and swirl to mix. The sample will turn brown.

5 Add Sodium Thiosulfate High Range (ST2776), drop-wise, while swirling, until the color just changes from brown to white. Record the number of drops.

6 Record Results.

# of drops x 50 = ppm chlorine dioxide ($ClO_2$)


PO Box 9932
West Palm Beach, FL 33419
Phone: (561) 848-1717
www.vitaltechnologies.com


### Safety Tips

- Wear appropriate safety equipment.
- Read MSDS before use.

### Tech Tips

- Always obtain test sample from a large composite sample.
- Be sure there is adequate lighting during testing.
- Rinse test vial 3 times with solution to be tested.
- Hold reagent bottles vertically for best results.
- Make sure you have an accurate sample.

EndPoint ID® Test Procedure +PLUS

REV 5/10

## Vital Oxide Fogger


### Operating Instructions

Fill Tank with Vital Oxide Disinfectant

Twist tank counter-clockwise 90˚ to remove power head. Add Vital Oxide and replace power head, making sure tank gasket is in place.

Slide the power switch to the “on” position. A fine mist will form. Adjust the control knob for the droplet size desired for your work (when using Vital Oxide, you may want to fog areas with a very fine mist). The Vital Oxide Fogger can produce a range of droplet sizes, from relatively coarse ones which settle quickly to fine fog particles which can float a long distance. The Vital Oxide Fogger puts out particles between 15 & 30 microns.

The control knob also regulates the liquid flow rate. After setting the droplet size, you can calculate the liquid flow rate by timing how long it takes to dispense a measured amount of liquid.

If possible, make your application in still air. Use an even sweeping motion, making certain to cover the entire target area. Do not over-apply. Since a fine mist is difficult to see, it is usually better to calculate fogging time and volume from the liquid flow rate than to rely on visible indications.

When finished fogging, remove and empty tank.

MODEL SPECIFICATIONS

Model Voltage VAC Current A Tank oz [l]  533010 120 3.0 32 [1]

## SC-1 Suitcase Sprayer

Another option in the electrostatic line-up is the SC1 Suitcase Sprayer.

This lighter weight, wheeled sprayer offers greater maneuverability than the XT3. All components are contained in a single housing.

A standard six foot hose can be replaced with a fifteen foot hose and the machine dispenses at a rate of one gallon per hour. The internal tank will accommodate up to one and a half gallons of Vital Oxide. Particle size is forty microns.

For disinfecting and sanitizing public areas, interior scapes and retail spaces

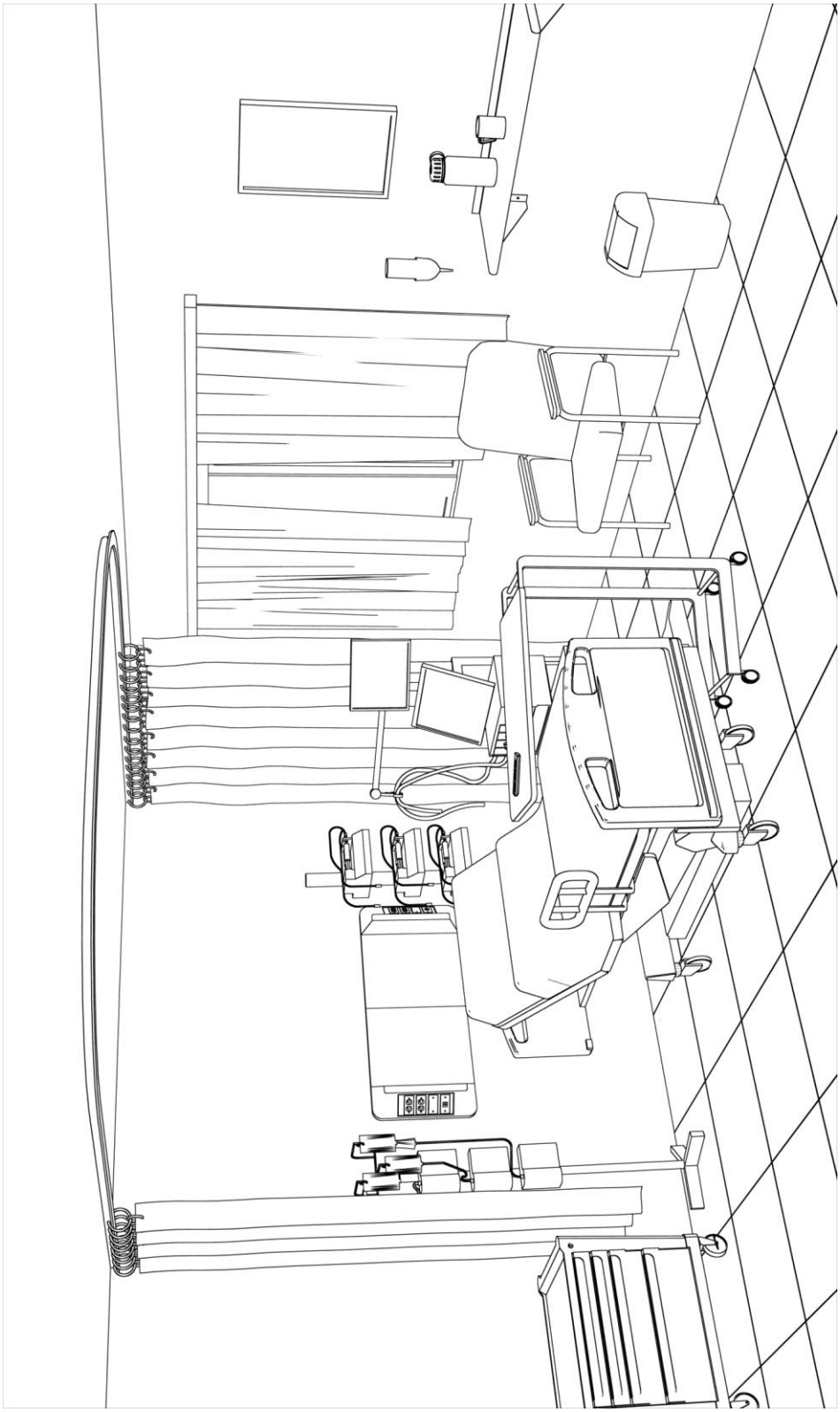
- Compact, unobtrusive sprayer ideal for sanitizing medical facilities and public transportation
- Durable wheeled case with extendable handle
- Electrostatic spray gun
- Self-contained, does not require an external air supply
- Removable internal tank (with quick connects) holds enough mix for 1 hour of spraying
- Compatible with most conventional chemicals
- Quiet operation
- Runs on 110 volts

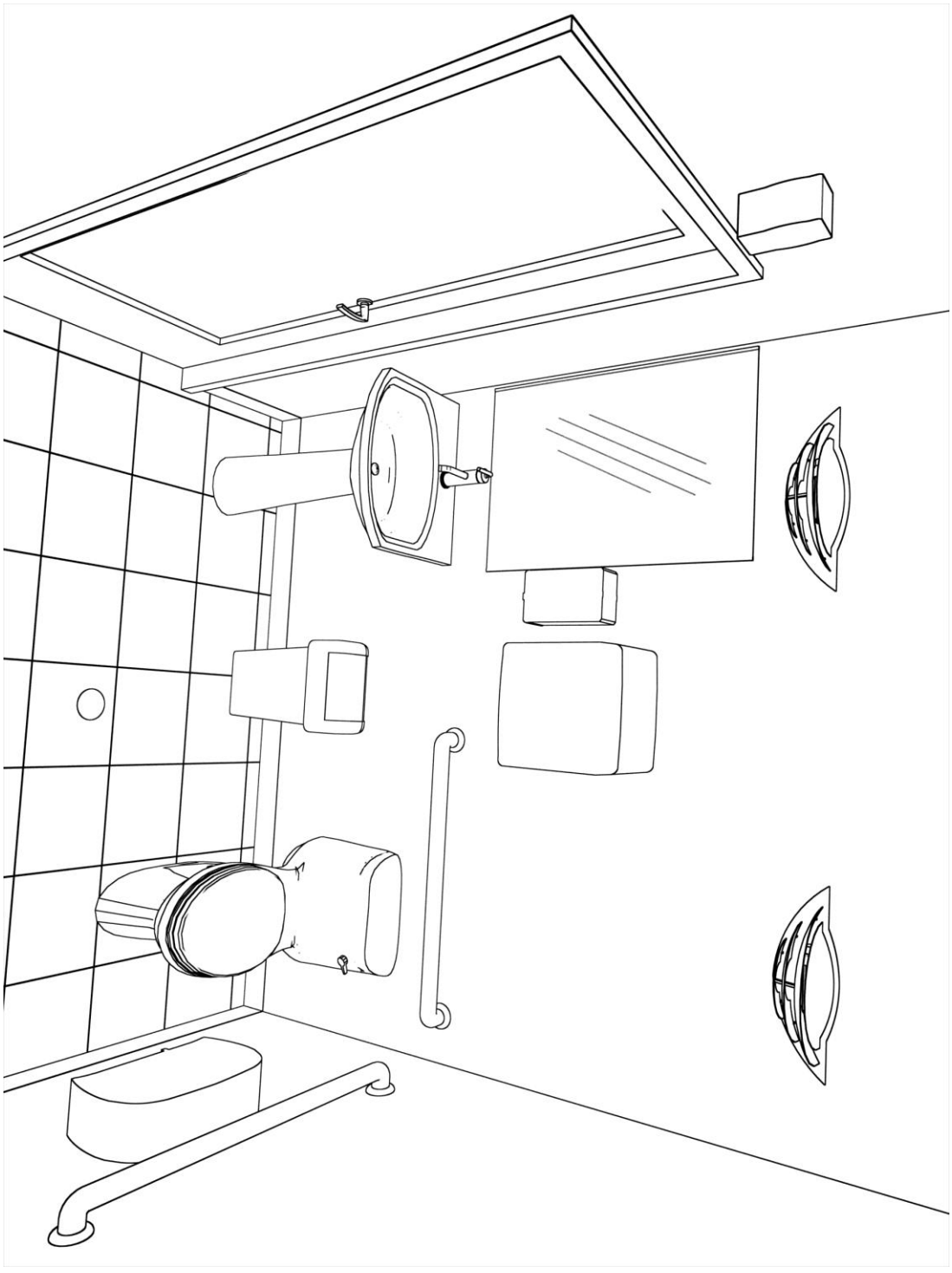
## XT-3 Commercial Electrostatic Sprayer

XT-3 Electrostatic spray gun

- Self-contained – does not require an external air supply
- Available in 110v and 220 v
- One liter auxiliary tank for easy spot spraying
- Main tank holds 3 gallons of mix enough for 1.5 hours of spraying
- Weight empty 105 lbs
- Dimensions 42" H X 18" W X 24" D
- Spray range 8 to 12 ft.

# Reference Diagrams





## Notes

# Testing Summaries and Vital Oxide Product Label

**Complete Independent Lab Testing Summary 2-4-2011**

| Bacteria | Use Method | Contact Time | Study Conclusion |
|---|---|---|---|
| Pseudomonas Aeruginosa ATCC 15442 | AOAC Use-Dilution | 10 min. | Hospital Grade Disinfection |
| Acinetobacter baumannii ATCC 19606 | AOAC Use-Dilution | 10 min. | Hospital Grade Disinfection |
| Escherichia Coli ATCC 11229 | AOAC Food Contact Sanitization | 30 sec | 99.999 kill (no rinse required) |
| Staphylococcus aureus ATCC 6538 | AOAC Food Contact Sanitization | 30 sec | 99.999 kill (no rinse required) |
| Pseudomonas Aeruginosa ATCC 15442 | DIS/TSS-8 Carpet Sanitzer | 10 min. | 99.9 Carpet Sanitizer |
| Enterbacter aerogenes ATCC 13048 | DIS/TSS-8 Carpet Sanitzer | 10 min. | 99.9 Carpet Sanitizer |
| Staphylococcus aures MRSA ATCC 33592 | AOAC Use-Dilution | 10 min. | Disinfection |
| Listeria monocytogenes ATCC 15313 | AOAC Use-Dilution | 10 min. | Disinfection |
| Escherichia Coli ATCC 11229 | AOAC Use-Dilution | 10 min. | Disinfection |
| Legionella Pneumophila ATCC 33153 | AOAC Use-Dilution | 10 min. | Disinfection |
| Salmonella choleraesuis ATCC 10708 | AOAC Use-Dilution | 10 min. | Disinfection |
| Staphylococcus aureus ATCC 6538 | AOAC Use-Dilution | 10 min. | Disinfection |
| **Fungi** | | | |
| Aspergillus Niger ATCC 6275 | Hard Surface Mildew Fungistatic | 10 min. | >1 week protection |
| Stachybotrus chartarum | Sporicidal viability | 10 min. | no germination of spores |
| Aspergillus fumigatus | Sporicidal viability | 10 min. | no germination of spores |
| Alternaria alternata | Sporicidal viability | 10 min. | no germination of spores |
| Penicillum sp | Sporicidal viability | 10 min. | no germination of spores |
| Aspergillus Niger ATCC 6275 | Fabric Mildew Fungistatic | 10 min. | >4 weeks protection |
| **Virus** | | | |
| Rotavirus | Virucidal Efficacy | 5 min. | complete inactivation |
| Hepatitis C Virus | Virucidal Efficacy | 5 min. | complete inactivation |
| Hepatitis B Virus | Virucidal Efficacy | 5 min. | complete inactivation |
| Norovirus Feline Calicivirus | Virucidal Efficacy | 5 min. | complete inactivation |
| Murine Norovirus (MNV-1) | Virucidal Efficacy | 5 min. | complete inactivation |
| Swine Influenza (H1N1) Virus | Virucidal Efficacy | 5 min. | complete inactivation |
| Respiratory Syncytial Virus | Virucidal Efficacy | 5 min. | complete inactivation |
| Human Immunodeficiency Virus (HIV Type 1) | Virucidal Efficacy | 5 min. | complete inactivation |
| **Toxicity Data** | | **E.P.A Toxicity Rating** | |
| Dermal Sensitization | Buehler Method | Category 4 | |
| Dermal Irritation | Limit test | Category 4 | |
| Acute Inhalation Toxicity | Limit test | Category 4 | LC50 is greater than 2.09mg/l |
| Acute Dermal Toxicity | Limit test | Category 4 | LD50 is greater than 5000mg/kg |
| Accute Oral Toxicity | Limit test | Category 4 | LD50 is greater than 5000mg/kg |
| Ocular Irritation | Limit test Max. Mean Score 15.7 | Category 3 | Mildly irritating, cleared within 72 hrs |

EPA Reg. No 82972-1
www.vitaloxide.com

Disinfects As It Cleans •Eliminates Odors • Fragrance Free

**VITAL OXIDE** provides hospital disinfection, sanitization of food contact surfaces, mold & mildew prevention, broad spectrum cleaner & odor elimination.

AREAS OF USE INCLUDE: homes, vehicles. schools & daycare, gyms & locker rooms, sports gear, hospitals, nursing homes, laundry rooms, veterinary, pharmacies, ambulances, barber shops, laboratories, restaurants, boats, ships, federally inspected meat & poultry processing plants, farms, animal pens and poultry houses, egg processing premises, hatcheries, swine premise sanitation, refrigerated storage units, airplanes, trains, trucks, buses & automobiles. Use as a mold & mildewstat on hard non-porous surfaces such as tile, and porous surfaces such as fabric.

DIRECTIONS FOR USE: It is a violation of Federal Law to use this product in a manner inconsistent with its labeling. Shake well before using. Test fabric for color fastness. Contains a dilute oxidizing agent. Do not mix with vinegar or acidic cleaners.

**Pre-cleaning Instructions:** Remove gross filth and heavy soil by cleaning. Spray **VITAL OXIDE** straight onto soils, scrub and wipe clean with a dry paper towel or cloth. For cleaning floors add one cup **VITAL OXIDE** per gallon of water in bucket and clean with sponge, mop or pad.

**To Disinfect Hard Non-porous Surfaces:** For disinfecting pre-cleaned hard non-porous surfaces such as glass, plastic, painted wood, laminate, chrome, stainless steel, polyurethane coated hardwood floors, glazed ceramic tile, sealed concrete & linoleum floors. Types of items include: appliances, bed frames, cabinet handles, wheelchairs, child car seats, counters, cribs, doorknobs, tables, tubs, exterior toilet surfaces, faucet handles, handrails, jungle gyms, keyboards, light switch covers, patio furniture, showers, sinks, stovetops, telephones, toys, walls, waste containers. Apply **VITAL OXIDE** full strength to pre-cleaned hard non-porous surfaces, wetting thoroughly with spray, sponge, mop, or by immersion in solution. Allow surfaces to remain wet for 5 minutes for virus inactivation - 10 minutes for bacteria disinfection. For immersion replace solution daily, or more frequently if it becomes significantly soiled or diluted.

**To Prevent Mold or Mildew on Floors, Walls, Ceilings & Fabric:** Remove as much surface dirt, mold, or mildew as possible by cleaning. Then spray on **VITAL OXIDE** from a distance of 12 inches until visibly wet and let air dry. **To Deodorize: VITAL OXIDE** works by oxidation, not by masking of odors. Eliminates odors caused by fire smoke, tobacco smoke, musty odors, stale-cooking odors. Simply spray, fog or wipe on full strength and let air dry to provide long lasting residual deodorizing action. When fogging apply 1 quart per 2000 cubic ft. following fogger manufacturer's directions for use. **VITAL OXIDE** must come into contact with the cause of the odor to be effective. For pet urine stains in carpet, blot urine as dry as possible then saturate stain with **VITAL OXIDE** through carpet pad.

**To Sanitize Food Contact Surfaces**: *Staphylococcus aureus* (ATCC 6538) and *Escherichia coli* (ATCC11229) 99.999% sanitization of food contact surfaces. Mix 1part VITAL OXIDE to12 parts tap water. For glassware, utensils, cookware, and dishware: Scrape and pre-wash, then wash with a good detergent. Rinse with potable water, then sanitize by immersion in VITAL OXIDE for 1 minute (or longer if specified by government sanitary code) Place on a rack or drain board to air dry. Do not rinse or wipe. Food Contact Immobile Surfaces: (food processing equipment, counter tops, tables, appliances) Remove all gross food particles and soil by cleaning and rinse with potable water. Apply VITAL OXIDE by wetting thoroughly and let stand for 1 minute. (or longer if specified by government sanitary code) Let surfaces drain and air dry. Do not rinse or wipe.

# VITAL OXIDE®

## HOSPITAL DISINFECTANT

99.999% SANITIZATION OF FOOD CONTACT SURFACES

No rinse required sanitizer for food contact surfaces (D-2)

MOLD & MILDEW REMOVER
*PREVENTS MOLD & MILDEW*
ON HARD SURFACES & FABRIC

**HEAVY DUTY ODOR ELIMINATOR**

**VITAL-OXIDE KILLS:**

***MRSA, Pseudomonas aeruginosa, Escherichia coli, Salmonella enterica, Staphylococcus aureus, Legionella pneumophila. Aspergillus niger, Norovirus****(Feline Calicivirus as surrogate)*
***Human Immunodeficiency virus type 1(HIV-1), Enterobacter aerogenes, Listeria monocytogenes, Acinetobacter baumannii, Rotavirus, Respiratory Syncytial Virus, Influenza A (H1N1)Swine Flu, Hepatitis B, Hepatitis C***

ACTIVE INGREDIENTS:

| | |
|---|---|
| Chlorine Dioxide | 0.200% |
| Alkyl (60% $C_{14}$ 30% $C_{16}$ 5% $C_{12}$ 5% $C_{18}$) dimethyl benzyl ammonium chloride | 0.125% |
| Alkyl (68% $C_{12}$ 32% $C_{14}$) dimethyl ethylbenzyl ammonium chloride | 0.125% |
| OTHER INGREDIENTS | 99.550% |
| Total | 100.000% |

KEEP OUT OF REACH OF CHILDREN
CAUTION
See side panel for additional precautionary statements

NET CONTENTS: 128 oz.

**To Sanitize Carpet:** For synthetic carpet fibers such nylon, olefin, or polypropylene – not intended for use on wool carpet. Test for color fastness in an inconspicuous area. Carpet should be clean or free of excessive soil before applying. Mix 1 part Vital Oxide to 5 parts water. Apply by sprayer at a rate of 1.7 gallons per 10 sq. yards (approx 22oz per sq. yd). Vital Oxide must come into contact with contaminate to work. Allow to dwell for 10 minutes. Do not rinse, use an extraction wand and dry stroke carpet to remove excess moisture. Carpet can air dry or fans may be used if carpet needs to dry faster.

**To Disinfect Farm Premises, Poultry Houses, Animal Pens & Vehicles:** Remove all animals and feed from premises, vehicles, and enclosures. Remove all litter and manure from floors, walls and surfaces of barns, pens, stalls, chutes, and other facilities and fixtures occupied or traversed by animals. Empty all troughs, racks, and other feeding and watering appliances. Thoroughly clean all surfaces with soap or detergent and rinse with water. Saturate all surfaces with **VITAL OXIDE** for a period of 10 minutes. Immerse all halters, ropes, and other types of equipment used in handling and restraining animals, as well as forks, shovels, and scrapers used for removing litter and manure. Allow to air dry. Ventilate buildings, cars, boats, and other closed spaces. Drain any pooled product and/or rinse standing product with potable water. Do not house livestock or employ equipment until treatment has been absorbed, or dried.

**KILLS HIV-1,HBV,AND HCV ON PRE-CLEANED ENVIRONMENTAL SURFACES/OBJECTS PREVIOUSLY SOILED WITH BLOOD/BODY FLUIDS** in health care settings or other settings in which there is an expected likelihood of soiling of inanimate surfaces /objects with blood or body fluids and surfaces/objects likely to be soiled with blood or body fluids can be associated with the potential for transmission of Human Immunodeficiency virus type1 (HIV-1) (associated with AIDS), Human Hepatitis B virus, and Human Hepatitis C virus.

**SPECIAL INSTRUCTIONS FOR CLEANING AND DECONTAMINATION AGAINST HIV-1, HBV, and HCV ON SURFACES/OBJECTS SOILED WITH BLOOD/BODY FLUIDS**

PERSONAL PROTECTION: When handling items soiled with blood or body fluids use disposable latex gloves, gowns, masks, or eye coverings.

CLEANING PROCEDURES: Blood and other body fluids must be thoroughly cleaned from surfaces and objects before application of this product.

DISPOSAL OF INFECTIOUS MATERIALS: Blood and other body fluids should be autoclaved and disposed of according to Federal, State and local regulations for infectious waste disposal.

CONTACT TIME: Allow surfaces to remain wet for 5 minutes. This contact time will not control bacteria.

STORAGE AND DISPOSAL: Store in original closed container in a cool, dry place away from heat and open flame. DISPOSAL: Triple rinse (or equivalent). Then offer for recycling or reconditioning, or puncture and dispose of in sanitary landfill, or incineration, or if allowed by state and local authorities, by burning. If burned, stay out of smoke.

PRECAUTIONARY STATEMENTS:

HAZARDS TO HUMANS & DOMESTIC ANIMALS

Causes moderate eye irritation. Avoid contact with eyes

| FIRST AID | |
|---|---|
| If in Eyes | Hold eye open and rinse slowly with water 15-20 mins. Remove contact lenses after first 5 mins. and continue rinsing. Call a Poison Control Center or doctor for treatment advice. Have product container or label with you when calling a poison control center or doctor, or going for treatment. |

Manufactured by: Vital Technologies, Inc. PO Box 9932 W. Palm Bch, FL 33419
Customer Service: 1-800-303-5405 www.vitaltechnologies.com
EPA Reg. No. 82972-1 EPA Est. No. 85804-NC-1: EPA Est. No 29909-CA-1
(See batch code for actual establishment number) NOTICE: Seller expressly warrants that the product conforms to its chemical description. There are no other warranties associated with the sale of this product.

# An Intervention to Reduce the Rate of Hospital-Acquired Acinetobacter Infections in an Urban Community Teaching Hospital

Robert B. Hulette, Infection Control and Patient Safety Officer, Nashville General Hospital at Meharry
Adjunct Assistant Professor, Family and Community Medicine, Meharry Medical College

Metropolitan Nashville Hospital Authority

## BACKGROUND

Incidence of Acinetobacter infection in hospitals has dramatically increased in recent years becoming a significant global problem. (1,2)

These infections are often very difficult and costly to treat and have a mortality rate that approaches 75% in some settings (1, 2, 3). Moreover, Acinetobacter presents significant infection Control challenges since it may colonize both environmental surfaces as well as skin surviving for many months, may readily cause Hospital-Acquired Infections (HAI), is often resistant to multiple antibiotics, and often infects critically ill patients. (2,4,5,6). Accordingly, hospitals are often forced to take extensive and costly steps to prevent its spread that may be impractical in resource-limited settings. We present an easy to implement program for the reduction of Acinetobacter HAI rates in hospitals.

## METHODS

For this project we initiated a program in a 100-bed urban community teaching hospital in the U.S. whereby the Hospital Environmental Services Staff was notified immediately and automatically if any culture of any specimen taken from a hospital inpatient was found to be positive for Acinetobacter. Upon receiving this notification, the EVS staff would augment their standard terminal cleaning procedures by fogging the patient room with a chlorine dioxide solution (Figure 1) at the time of patient discharge in addition to their standard cleaning practices (Figure 2). We then reviewed the rates of infections meeting CDC NHSN definitions for HAI resulting from these pathogens for the 12 month period before and after the initiation of the intervention through active and passive surveillance of laboratory and other clinical records, coding data, and syndromic surveillance as well as the rate of community acquired laboratory-confirmed community acquired infections over this same time frame

## INTERVENTION PROCESS

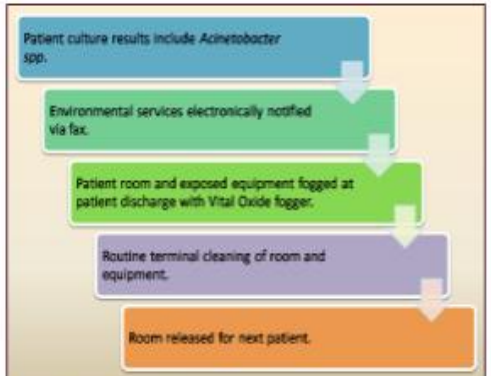



Figure 1. Intervention Process


Figure 2. Chlorine Dioxide Solution and fogger

## RESULTS

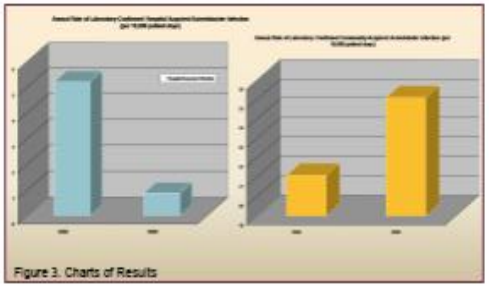


Figure 3. Charts of Results

## RESULTS CONT'D

In the 12 month period prior to the intervention, 13 Acinetobacter HAI were identified out of 25089 patient days for an aggregate rate of 5.2/10000 patient days (95% CI 3.0-8.9). For the period of the intervention only 2 Acinetobacter HAI were identified out of 22704 patient days for an aggregate rate of 0.88/10,000 patient days (95% CI 0.2-3.2) a decrease in Acinetobacter HAI Rate of 4.3/10000 (95% CI 1.1-8.0) Over the study period, the incidence of laboratory-confirmed community acquired Acinetobacter infection increased slightly from 4.42/month to 4.75/month.

## CONCLUSIONS

The fogging of patient rooms of Acinetobacter infected patients with chlorine dioxide at discharge implemented at our hospital led to significant reductions in Acinetobacter HAI rates without the need for intrusive and costly additional interventions.

## ACKNOWLEDGEMENTS

The Author wishes to thank the following:

Mr. Dean Miller and the NGH EVS Team
The Meharry Acinetobacter Study Team (MAST)
Mr. James Burnett

Acinetobacter image courtesy of Case Western Reserve University
http://www.case.edu/think/breakingnews/Bacteria.html

Funding for this project was provided solely by Nashville General Hospital at Meharry.
The author reports no conflicts of interest.

## LITERATURE CITATIONS

1. Sunenshine, R.H, Wright, M. et. al.(2007) Multidrug-resistant Acinetobacter Infection Mortality Rate and Length of Hospitalization. Emerging Infectious Diseases . Vol. 13, No. 1. pp 97-103
2. Munoz-Price, L.S. and Weinstein, R.A.(2008) Acinetobacter Infection. N Engl J Med;358:1271-81
3. Falagas, M.E. and Rafailidis,P. (2007) Attributable mortality of Acinetobacter baumannii: no longer a controversial issue. Critical Care, 11:134
4. Perez, F. et al (2010) Antibiotic resistance determinants in Acinetobacter spp and clinical outcomes in patients from a major military treatment facility. American Journal of Infection Control. 38:1. Pp60-65
5. Y. Doi, et. al (2009) . Extensively Drug-Resistant Acinetobacter baumannii. Emerging Infectious Diseases.15:6 pp. 980-981
6. Houang, E.T.S. et al (2001) Epidemiology and Infection Control Implications of Acinetobacter spp. in Hong Kong. Journal of Clinical Microbiology 39:1 pp 205-204.

## EPA Toxicity Category Rating System

| | BLEACH | PHENOLS | QUATS | Vital Oxide! | |
|---|---|---|---|---|---|
| **Toxicity Study** | **Category I High Toxicity** | **Category II Moderate Toxicity** | **Category III Low Toxicity** | **Category IV Very Low Toxicity** | **EPA Toxicity Rating** |
| **Acute Oral** | Up to and including 50 mg/kg | >50 thru 500 mg/kg | >500 thru 5000 mg/kg | >5000 mg/kg | Category IV Very Low Toxicity |
| Acute Dermal | Up to and including 200 mg/kg | >200 thru 2000 mg/kg | >2000 thru 5000 kmg/kg | >5000 mg/kg | Category IV Very Low Toxicity |
| Acute Inhalation | Up to and including 0.05 mg/liter | >0.05 thru 0.5 mg/liter | >0.5 thru 2.0 mg/liter | >2mg/liter | Category IV Very Low Toxicity |
| Eye Irritation | Corrosive (Irreversible destruction of ocular tissue) or corneal involvement or irritation persisting for more than 21 days | Corneal involvement or irritation clearing in 8-21 days. | Corneal involvement or irritation clearing in 7 days or less | Minimal effects clearing in less than 24 hours | Category III Low Toxicity |
| Skin irritation | Corrosive (Tissue destruction into the dermis and/or scarring) | Severe irritation at 72 hours (Severe erythema or edema) | Moderate irritation at 72 hours (Moderate erythema) | Mild or slight irritation (No irritation or slight erythema) | Category IV Very Low Toxicity |

# Material Safety Data Sheet (MSDS)

# Material Safety Data Sheet

January 31, 2011

# Vital Oxide

## Section 1: Product and Company Identification

**Product Name** Vital Oxide

Aqueous Oxidant

**Manufacturer/Distributor**

Vital Solutions, LLC
PO Box 9922
West Palm Beach, FL 33404

| | | |
|---|---|---|
| H | 0 | |
| F | 0 | |
| R | 0 | |
| PE | -- | |

**Phone Numbers**

**Product Information** (561) 848-1717
**Medical Emergency** (800) 222-1222

## Section 2: Composition/ Information on Ingredients

| Ingredients | CAS Number | Wt % |
|---|---|---|
| Oxychlorine Compounds | Mixture | 0.200 |
| n-Alkyl Dimethyl Benzyl Ammonium Chloride | 68391-01-5 | 0.125 |
| n-Alkyl Dimethyl Ethylbenzyl Ammonium Chloride | 85409-23-0 | 0.125 |
| Inert Ingredients | Mixture | 99.55 |

At these concentrations none of the ingredients are known to pose any hazards to human health.

## Section 3: Hazards Identification

**Emergency Overview**

Colorless liquid with mild fresh odor. Avoid contact with eyes. Keep out of reach of children.

**HMIS Rating:** **Health:** 0 **Flammability:** 0 **Reactivity:** 0 **PPE:** None

**Potential Health Effects**

Eye Contact: Eye contact may cause mild eye irritation with discomfort.

Skin Contact: Does NOT cause skin irritation and the product is NOT skin sensitizer.

Inhalation: Does NOT cause any respiratory irritation. If consumer product accidentally contacts strong acids in restricted ventilation area, avoid breathing the vapors and allow adequate time for the vapors to disperse before re-entering the restricted area.

Ingestion: Non-toxic

**Carcinogenicity Information**
None of the components present in this material at concentrations equal to or greater than 0.1% are listed by IARC, NTP, OSHA, and ACGIH as carcinogens.

## Section 4: First Aid Measures

**Inhalation**
Does NOT cause any respiratory irritation. If consumer product accidentally contacts strong acids in restricted ventilation area, avoid breathing the vapors, and allow adequate time for the vapors to disperse before re-entering the restricted area.

**Skin Contact**
Does NOT cause skin irritation.

**Eye Contact**
In case of contact, flush eyes with plenty of water.

**Ingestion**
Non-toxic. Give a glass of water.

## Section 5: Fire Fighting Measures

**Flammable Properties:**
**Flash Point:** Not Available (Non Flammable) **Burn Rate:** Unknown

**Flammable Limits:**
**Lower Flammable Limit:** Not Established **Upper Flammable Limit:** Not Established

**Flammability Classification:** Non-Flammable liquid **Autoignition Temperature:** Not Established

**Hazardous Combustion Products:** Thermal or other decomposition may yield chlorine dioxide or chlorine.

**Extinguishing Media:** N/A (Non-Flammable liquid) **Additional Considerations:** None

**FIRE FIGHTING INSTRUCTIONS:** Non-Flammable liquid

**NFPA Rating:** **Health:** 1 **Flammability:** 0 **Reactivity:** 0 **PPE:** B

## Section 6: Accidental Release Measures

**Spill Clean-Up**
No special clean-up measures are required for the consumer product. To avoid the possibility of “bleaching” the spill should be absorbed with paper towels, and the area rinsed with clean water.

**Accidental Release Measures**
Spills are slippery and should be cleaned up promptly.

## Section 7: Handling and Storage

**Handling:** Keep away from heat and strong acids. Do not ingest. Keep container closed. Use only with adequate ventilation.

**Storage:** Keep container tightly closed and sealed until ready for use. Keep container in a well-ventilated place. Do not store above 120$^{o}$F or near fire of open flame. Store large quantities in buildings to comply with OSHA 1910.106. Do not transfer contents to bottles or other unlabelled containers. Do not reuse empty containers. Keep out of reach of children.

**Incompatible materials:** Strong acids.

**Special Packaging Materials:** None

## Section 8: Exposure Control/ Personal Protection

**Engineering Controls:** Use in adequately ventilated areas.

**Personal Protective Equipment:**

**Eye/Face Protection:** Not required for consumer product.

**Skin Protection:** Not required for consumer product.

**Respirators:** None required for normal use. If consumer product accidentally contacts strong acids in restricted ventilation area, avoid breathing the vapors, and allow adequate time for the vapors to disperse before re-entering the restricted area.

**Exposure Limits:**

**Oxychlorine Compounds:**

PEL (OSHA): Not available
TLV (ACGIH): Not available

**n-Alkyl Dimethyl Benzyl Ammonium Chloride:**

PEL (OSHA): Not available
TLV (ACGIH): Not available

**n-Alkyl Dimethyl Ethylbenzyl Ammonium Chloride:**

PEL (OSHA): Not available
TLV (ACGIH): Not available

## Section 9: Physical and Chemical Properties

| | | | |
|---|---|---|---|
| **Appearance:** | Colorless Liquid | **Odor:** | Mild-Fresh |
| **Physical State:** | Liquid | **pH:** | 8 - 9 |
| **Boiling Point (°F):** | 212 | **Solubility in Water:** | 100% |
| **Freezing Point (°F):** | 32 | **Vapor Pressure (mm Hg):** | Not Available |
| **Volatile Organic Compounds (VOC):** | None | **Evaporation Rate:** | Less than Ether |
| **Specific Gravity:** | 1.008 @ 68°F (20°C) | **Density (lb/gal):** | 8.40 @ 68°F (20°C) |

## Section 10: Stability and Reactivity

**Chemical Stability:** The product is stable.

**Incompatibility with other Materials:** Strong acids.

**Conditions to avoid:** Contact with strong acids

**Hazardous Polymerization:** Will not occur.

**Hazardous Decomposition Products:** Thermal or other decomposition may yield chlorine dioxide or chlorine.

## Section 11: Toxicological Information

**TOXICITY TESTING –** ACUTE **Inhalation** – Studies with Wistar Albino rats exposed to a respirable aerosol made from a solution of Vital Oxide at a level of 2.08 mg/l for four hours resulted in no deaths and no abnormal necropsy observations. **Eye Contact** – Studies with New Zealand white rabbits showed this product is a very mild ocular irritant; mild conjunctival irritation was observed, but cleared within 72 hours. **Skin Contact** – Study of dermal toxicity in New Zealand white rabbits showed the product to be non-toxic: Dermal $LD_{50}$> 5,000 mg/kg of body weight; Study of dermal irritation in New Zealand white rabbits showed the product is not a dermal irritant. In Dermal Sensitization studies, Vital Oxide was determined not to be a sensitizer. **Swallowing** - Acute oral toxicity in albino rats: Non-toxic $LD_{50}$>5,000 mg/kg of body weight.

**EPA TOXICITY RATING – IV (For all exposure routes except for mild eye irritation)** This is the lowest category on the scale and is designed for substances that are the least hazardous.

## Section 12: Ecological Information

**Environmental Hazards:** Not data available.

**Environmental Fate:** Not data available.

## Section 13: Disposal Considerations

**Waste Disposal:** Treatment, storage, transportation, and disposal must be in accordance with applicable Federal, State/Provincial and Local regulations.

## Section 14: Transport Information

**Shipping Information:** Not regulated by DOT, IMO/IMDG and IATA/ICAO for ground, air or ocean shipments.

## Section 15: Regulatory Information

**U.S. Federal Regulations:**

**TSCA:** All components appear in TSCA Inventory **OSHA:** Refer to Section 8 for exposure limits.

**CERCLA SARA Hazard Category:**

**Section 311 and 312:** This product has been reviewed according to the EPA "Hazard Categories" promulgated under Sections 311 and 312 of the Superfund Amendment and Reauthorization Act of 1986 (SARA Title III) and is considered, under applicable definitions, to meet the following categories: None

**Section 313:** This product contains following substances subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372: None

**State regulations:**

State Right to Know information is not provided. **California prop. 65 (no significant risk level):** None

**International Regulations:**

**Canadian WHMIS:** Not controlled

**Canadian Environmental Protection Act (CEPA):** Additional information available upon request.

**EU Regulations:** Additional information available upon request.

## Section 16: Other Information

The information is furnished without warranty, expressed or implied, except that it is accurate to the best knowledge of Vital Technologies, Inc. The Data on this sheet related only to the specific material designed herein. Vital Technologies, Inc. assumes no legal responsibility for the use or reliance on this data.

End of MSDS

# VitalOxide®

**Exceptional Performance, Easy to Use**

# ONE PRODUCT, FIVE SOLUTIONS!


*Vital Oxide is an EPA registered hospital disinfectant cleaner, mold killer and super effective odor eliminator. Ready to use, with no mixing required, just spray, wipe or fog right from the bottle. Non-irritating to the skin and non-corrosive to treated articles.*

1. **EPA Registered Hospital Disinfectant**
   Proven to kill a wide range of viruses and bacteria Vital Oxide won't contribute to the formation of mutating "super bugs", and does not contain volatile organic compounds (VOCs).

2. **Food Contact Sanitizer – No Rinse Required – NSF Registered (D2) Sanitizer**
   99.999% Sanitization on food contact surfaces. Vital Oxide is odorless and won't alter the taste of food on sanitized surfaces. Vital Oxide kills 99.999% of bacteria, including e Coli, Salmonella and Listeria in less than 60 seconds.

3. **Molds & Mildew Killer**
   Kills and prevent spores with up to 7 months residual effects. Safe on a wide range of surfaces, marble to carpeting and beyond.

4. **Allergen Eliminator**
   Proven effective on pet dander as well as dust mite and cockroach allergens. Can be used directly on pet bedding & sleeping areas.

5. **Odor Eliminator**
   End malodors caused by smoke, trash, septic systems, stale cooking & more. Vital Oxide contains no masking agents or fragrances and is highly effective at neutralizing urine and fecal odors.

## *Vital Oxide is proven to work on all surfaces*

### *GREAT FOR:*

- Hospitals and health care facilities
- Medical and science research labs
- Restaurants, cafeterias, food service facilities
- Cruise ships, hotels, hospitality services
- Schools, universities, educational facilities
- Jails, prisons, correctional institutions
- Government and public service offices

www.VitalOxide.com

# VitalOxide®

*Exceptional Performance, Easy to Use*

*WIDE-RANGE OF USES!*


# EXCEPTIONAL PERFORMANCE

## Economical & Easy to Dilute

Vital Oxide has three dilutions ratios:

- **Full Strength – For Hospital Disinfectant**
  *Heavy Duty Odor Eliminator & Mold and Mildew Killer*
- **5:1 – For Carpet and Fabric Sanitization**
  *Vital Oxide is compatible with most synthetic carpeting and commercial cleaning machines.*
- **12:1 – For 99.999% Sanitization on Food Contact Surfaces with No Rinse Required**
  *30 second kill time on Escherichia Coli & Staphylococcus aureus. Great for daily use.*

### Available in Convenient Sizes:

- **3 oz** – Travel Bottle
- **15 oz** – Pressurized Spray Bottle
- **32 oz** – Trigger Spray Bottle
- **1 Gallon** – Bottle
- **2.5 Gallon** – Bag in a Box
- **5 Gallon** – Bag in a Box

## Breakthrough Technology

**We have designed our product around a chemistry that is unique in all of nature. Effective on a broad spectrum of viruses, and bacteria, including "super bugs" like MRSA and H1N1, Vital Oxide breaks down to simple salt and produces no harmful byproducts.**

***Vital Oxide*** includes components that dramatically decrease the size of it's particles. This increases the ability of the active solution to spread and penetrate both hard and porous surfaces. This also makes it effective against airborne pathogens by reducing droplet size from sprayers and foggers.

*"As the president of a microbiology testing lab, I see and evaluate new antimicrobial technologies often. After extensive testing, I can comfortably say that Vital Oxide is one of the most exciting new technologies on the market. Its dual-active system cleans well and is effective against a wide variety of pathogens – most importantly, it does the job quickly."*

Benjamin D. Tanner, Ph.D.
President, Antimicrobial Test Laboratories

### SAFE, EFFECTIVE & LONG-LASTING

- USEPA Reg. No 82972-1 in all 50 states and Puerto Rico
- NSF rated (D-2) No Rinse Required on Food Contact Surfaces at full strength
- Hypo allergenic - Allergen reducing formula
- pH balanced at 8.5
- Shelf stable - over one year shelf Life
- No special shipping or handling instruction
- Odorless, with no offensive odor or taste
- Non-corrosive safe on treated articles like carpeting, fabrics, natural stones, plastics
- Non-irritating to skin no glove required

### VITAL OXIDE IN ACTION

- Used in emergency response to eliminate Norovirus out-breaks.
- Clinical trials have shown a decrease of 95% in Health-care Associated Infections (HAI'S) of Acientobacter spp in hospital environment.
- Used in disaster response to eliminate mold and mildew from flood damage.
- University and government sponsored studies document long-term effectiveness on mold and mold spores, even eliminating mold spores.

*FOR ORDERING INFORMATION CALL:*

***1-888-353-3649***

VitalOxide®

Vital Technologies, Inc.
7830 Byron Dr. Suite 12 • West Palm Beach, FL 33460 • www.VitalOxide.com

# VitalOxide®

***Exceptional performance, easy to use !***

# ONE PRODUCT, FIVE SOLUTIONS!

The *VItal Oxide* Spray can is a convenient alternative to trigger spray. The new BOV (Bag on Valve) can will spray at any angle, making it much easier to treat on those "hard to reach" places.


1. **EPA Registered Hospital Disinfectant**
Proven to kill a wide range of viruses and bacteria Vital Oxide won't contribute to the formation of mutating "super bugs" and does not contain volatile organic compounds (VOCs)

2. **Mold & Mildew Prevention**
Kills and prevents mold spores with up to 7 months residual protection. Safe on most hard and soft surfaces including carpeting, marble and natural stone

3. **Allergen Control**
Proven effective on pet dander as well as dust mite, and cockroach allergens. Can be used directly on pet bedding & sleeping areas.

4. **Odor Eliminator**
Eliminate Malodors caused by smoke, trash, septic systems, stale cooking & more. Vital Oxide contains no masking agents or fragrances and is highly effective at neutralizing urine and fecal odors.

5. **Food Contact Surface Sanitizer - No Rinse Required - NSF Registered (D2) Sanitizer**
99.999% Sanitization on food contact surfaces. Vital Oxide is odorless and won't alter the taste of food on sanitized surfaces. Vital Oxide kills 99.99% of bacteria, including eColi, Salmonella and Listeria in less than 60 seconds.

***WWW.VITALOXIDE.COM***

## *Vital Oxide is proven to work on a wide range of environments*

***GREAT FOR:***

- Hospitals and health care facilities
- Medical and science research labs
- Restaurants, cafeterias, food service facilities
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# VitalOxide

*Exceptional Performance, easy to Use !*

# BAG ON VALVE SPRAY CAN


- **99.999% Sanitization on Food Contact Surfaces**
- **Safe on Hard Non-Porous Surfaces and Soft Surfaces**
- ***30 second kill time on Escherichia Coli & Staphylococcus***

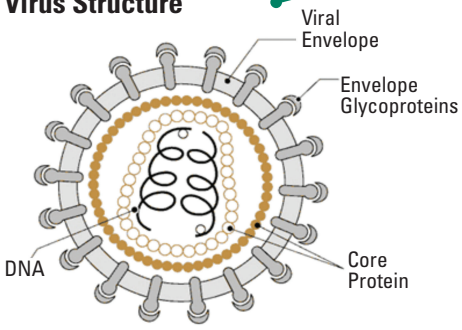
## Breakthrough Technology

### VITAL OXIDE BOV Can

**The Bag on Valve is not your ordinary aerosol can, it contains an FDA approved aluminum bag filled with Vital Oxide disinfectant. The compressed air surrounding the bag empties up to 99% of the product out of the bag through the valve conducting the contents to the actuator with no pump action needed. Vital Oxide does not contain any VOCs making the Bag on Valve a better choice for the environment.**

Inside of BOV spray can

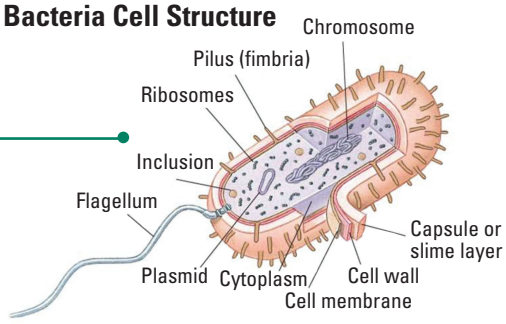
**Virus Structure**




**Viruses** are eliminated through selective oxidation . First attacking the viral envelope then the core protein preventing the production of protein and destroying the virus.

**Bacteria** are also eliminated through selective oxidation. Vital Oxide attacks the proteins in the cell wall then disrupting protein synthesis effectually killing the bacteria. Vital Oxide is effective on both gram positive and gram negative bacteria.

**Bacteria Cell Structure**

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- NSF rated (D-2) No Rinse Required on Food Contact Surfaces
- Hypoallergenic - Allergen reducing formula
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- Odorless
- Non-corrosive, will not harm treated articles like carpeting, fabrics, natural stones, plastics
- Non-irritating to skin; no gloves required

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**1-800-303-5405**