

A FRESH PERSPECTIVE ON CONTENTS DEODORIZATION

The Odorox® hydroxyl generating technology has proven to be an extremely effective method for deodorizing contents. The Odorox® systems were originally designed for eliminating odors and pathogens encountered by large industrial facilities like sewage plants, rendering plants, trash transfer stations, and food/beverage manufacturers. Five years ago, Odorox® technology was introduced to the disaster cleanup market and has since provided restoration companies with a safe, fast, and effective solution for permanent deodorization as an alternative to conventional deodorization methods such as ozone, filters, or chemicals.

About the Technology

Hydroxyl radicals ($\cdot\text{OH}$) are created naturally in the atmosphere when the sun's ultraviolet rays react with water vapor (H_2O) and oxygen (O_2). They rapidly decompose chemicals in the air and are sometimes referred to as "Nature's broom" because of their crucial role in helping to keep the earth's atmosphere clear of harmful inorganic and organic compounds. Hydroxyls work primarily by stealing hydrogen atoms, thereby dismantling the molecular structure of contaminants. The Odorox® technology replicates nature's process by using proprietary optics that generate hydroxyls using the same powerful range of UV light as the sun.

There are several advantages to using Odorox® systems instead of ozone for deodorizing contents. Hydroxyls are much more powerful oxidants and react about one million times faster than ozone. This means that hydroxyls can efficiently decompose essentially all organic compounds and many inorganic compounds. In contrast, ozone reacts with only certain types of organic compounds and does so very slowly. To be effective, it is necessary to use much higher levels of ozone – in the parts-per-million (ppm) range to increase reaction rates. At these levels, ozone is toxic to humans and animals and damages materials.

Unlike ozone, atmospheric hydroxyls produced by the Odorox® technology are safe for people, animals, plants, and all sensitive materials like rubber, plastic, leather, vinyl, electronics, paper, and artwork. Contents can be wet while being deodorized without risk as well. The Odorox® machines are effective for any odor and are commonly used for treating contents damaged by fire and smoke, water losses, mold, and volatile organic compounds (VOCs). This technology has also proven to be very effective for odors that are difficult for ozone or other deodorization methods, such as those caused by protein fires, fuel oil, sulfur compounds, and even the occasional skunk mishap.

Hydroxyls are so effective because free radical chemistry is very different from ozone molecular chemistry. Hydroxyls abstract hydrogen atoms from both organic and inorganic compounds, which then begins a cascade of free radical decomposition processes. The chain reaction of continued hydrogen atom abstraction continues throughout the treatment space and enables effective penetration, deodorization, and sanitization of porous materials such as clothing, furniture, or rugs. Eventually, the organic compounds decompose to form carbon dioxide and water. While the system is running, intermediates do not linger as they are very unstable and continue to decompose. By contrast, ozone is a stable molecule and cannot generate this type of free radical chain reaction.

The Simplicity and Flexibility

The overall safety and simplicity of the Odorox® equipment creates a lot of flexibility for content deodorization. The Odorox® machine can be placed inside rooms that are designed for contents, but it is not necessary. The machines can be placed outside the contents treatment room and injected into the room. In some applications, the emissions from a single Odorox® machine have been injected into multiple vaults for deodorization. Again, this is optional, but not

necessary. Simply placing the machine inside the room and letting it run 24/7 is all that is required. Difficult items can be tented for some containment and a greater concentration of hydroxyls. Contents can be treated anywhere or anytime, including the minute they arrive into your facility. The machines are small, only draw 1.6 amps, and are easy to operate.

The Odorox® technology can be used to deodorize contents before cleaning them, after cleaning them, or both. It is usually preferred to deodorize everything prior to cleaning. If there are any odors that happen to be noticed after cleaning, a quick Odorox® treatment afterwards can be applied. If it makes more sense for your application to deodorize everything after cleaning, that is acceptable as well.

All contents can be treated with the Odorox® technology and there is no risk of damage to any of the materials. Insurance companies and clients are very appreciative of the ability to restore all items including electronics, artwork, and important papers or collectables of significant real or sentimental value.

Most disaster cleanup contents applications take about 24 to 48 hours to fully deodorize everything using the Odorox® technology. There are many factors that can affect this, such as the severity of odor, size of the deodorization room, layout of contents, type of contents, etc. Some deodorization can be done within only a few hours, but some cases are so severe that it may take a few days.

Odorox® vs. PCO

There is another method for generating hydroxyls, but it is not well suited for disaster restoration. This method is called the photocatalytic oxidation method (PCO), where a single wavelength of UV light is radiated onto a surface coated with a semiconducting catalyst, which is primarily titanium dioxide. Hydroxyl radicals are formed near the titanium dioxide coated surface and are only able to treat some of the air passing through the machine, much like a filter.

Developed for the space shuttle, this approach generates sufficient oxidants to treat small volumes of air passing through the machine with low concentrations of odor or organic compounds. The PCO technology has been successful in light residential applications, but not treating medium to

large volumes of air, or medium to high concentrations of odors or contaminants. Furthermore, because there is no measurable output of hydroxyls this application may not be viable for deodorizing structures or contents.

The Odorox® method utilizes multiple wavelengths of higher energy UV light which are able to generate hydroxyls by reacting with water vapor and oxygen in the air. This process creates hydroxyls both inside and outside the machine, allowing it to deodorize compounds in the air as well as those absorbed by structures and contents. The high performance UV optics will generate high concentrations of hydroxyls that are equivalent to approximately 2 million hydroxyls per cubic centimeter throughout the treatment space, which is similar to what is found in nature.

Absolutely Safe

It is safe to run the Odorox® equipment and not worry about walking in and out of the room because the hydroxyls produced are the same as the atmospheric hydroxyls found in nature. As in nature, ozone is necessarily produced as a by-product of the UV irradiation process to produce hydroxyls. Residual levels of ozone produced are non-accumulative. When used in normally ventilated spaces and in compliance with the manufacturer's operating and safety instructions, residual levels of ozone are well below OSHA permissible exposure limits. It is important to contact us if there are any questions regarding your specific application.

Training and education for using the Odorox® technology for contents or other deodorization treatments is readily available. The manufacturer's operating and safety instructions, along with the disaster cleanup line of equipment coverage tables, can be obtained at www.odoroxhelp.com. Please contact Tom McArdle at tmcardle@odoroxhg.com or 305-338-8506 with any questions.

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