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INFORMATION PLEASE...

Technical Data for Fire, Smoke and Water Damage Restoration & Reconstruction

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Ozone

Ozone generators are electrically powered devices that produce an oxidizing odor control gas. For many years, ozone generators have been used extensively by restoration contractors for the removal of fire related smoke odor. Ozone gas (O_3) is an oxidizing gas that destroys organic odor molecules such as smoke and protein. Although ozone has been proven to work in solving these problems, exactly how this action is accomplished has been somewhat vague. Ozone is called an oxidizer because it uses a form of oxygen to accomplish its task. Ozone is comprised of two molecules of oxygen (O_2), plus one molecule of (O), and when combined (O_3) is created.

Ozone, as an airborne generated gas or molecule, “bumps” into other molecules, some odorous and some not. As this bumping occurs, the ozone pulls away electrical energy from the odorous molecule. This causes a loss of electrons. In an attempt to recover what

is lost, the deprived molecule pulls in the extra oxygen (O) of the ozone molecule. This addition of the (O) splits the odorous molecule apart and destroys it. As the oxides are split apart, the electrical bond holding the molecule together is broke. This action neutralizes the odor molecule permanently.

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For this action to be successful Purofirst technicians must perform a thorough pre-cleaning of fire residues. Research has proven that fire residues interfere with ozone action if they are not removed.

In fire restoration, ozone units are used only in uninhabited areas. They generate an ozone output of .1 ppm (parts per million). At this level ozone gas is toxic, and Purofirst technicians must be certain that all life forms are evacuated while the gas is in use. Ozone gas can be used for all general fire related odors. The length

of time that the ozone is used depends on the severity of the odor. If the odor was caused by burning wood or paper products ozone gas may be effective in twenty-four hours. If the odor was caused by burning proteins such as meat or eggs the process could take forty-eight to seventy-two hours.

When used on location, the ozone generator should be safely placed one per floor. Because ozone gas is heavier than air and falls down and builds from the ground up, each generator should be placed as high as it can be within the room. Ozone use is aided by gentle air circulation, especially from overhead ceiling fans. Purofirst does not recommend the use of ozone under any continual occupancy. The area must be evacuated and warning signs (“Do Not Enter”) posted informing all concerned that ozone gas is in use.

While used on location, technicians must also remove sensitive plants especially exotics. Since they are

a life form, they will be terminated.

Natural latex rubber, which is present as elastic in many clothing and garments, is also negatively affected. Purofirst technicians often utilize an ozone chamber specifically constructed at their work location to thoroughly deodorize smoke-damaged contents. This is a very safe and effective use of ozone. Items must be cleaned for the ozone to be effective and not bunched too closely together. Areas treated with ozone must be "aired out" for at least two to three hours after ozone use. The output of ozone generated under closed conditions will raise the part per million (ppm) to very high levels. Originally it was thought that ozone converts back quite readily to normal oxygen. However, research conducted by the Association of Specialists in Cleaning and Restoration (ASCR) has shown that the ozone has a life expectancy greater than anticipated.

Some ozone generators are sold as air purifiers and

are used for continual occupancy. These units distribute .04 ppm of ozone, which is less than the .1 ppm level emitted by larger industrial units. However, these units have come under much criticism by the EPA and OSHA alike. Even at .04 ppm ozone gas still has vastly different chemical and toxicological properties from regular oxygen. When inhaled, ozone can damage the lungs. Relatively low amounts can cause chest pain, coughing, shortness of breath, and throat irritation. The FDA requires ozone output of indoor medical devices to be no more than .05 ppm. OSHA requires that workers not be exposed to an average concentration of more than .01 ppm for eight hours. NIOSH recommends an upper limit of .01 ppm not to be exceeded at any time. The EPA National Ambient Air Quality Standards for ozone is a maximum eight-hours' average outdoor concentration of .08 ppm. Contrary to popular belief, ozone does not remove carbon monoxide.

With the increased

chemical hypersensitivity issues involving the use of fragrances such as thermal fog, technicians may be more inclined to use ozone for severe odors. Ozone gas is one of the most effective deodorizers for decay and putrefaction. Restorative technicians are often called to remove odors caused by a tragic death scene scenario. If a human body dies and is undetected for a period of time, the resulting odor is undoubtedly one of the worst to be encountered. After thorough and meticulous cleaning, only the sustained use of ozone will remove and permanently neutralize the protein odor molecule. Protein molecules contain sulfur and nitrogen compounds which intensify the odor level.

In conclusion, ozone will continue to be used responsibly by Purofirst technicians to solve the odor problems created by fire, smoke, and other malodor scenarios. For more information on how to use ozone responsibly, contact your local Purofirst office.

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