

Questions and Answers About Renting Ozone Equipment

www.ozonesolutions.com

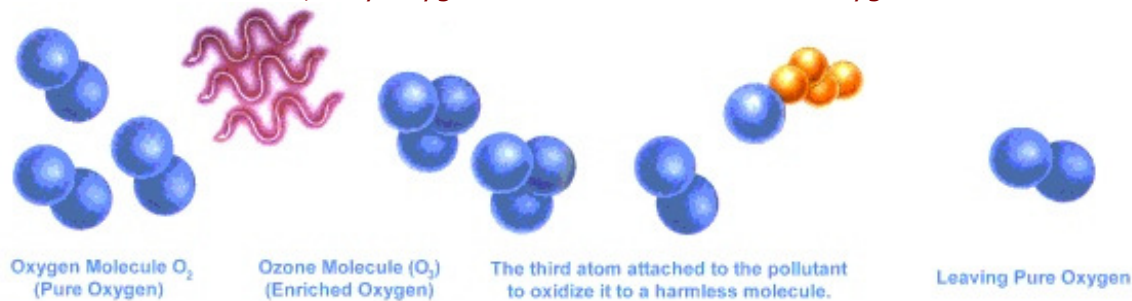


WHAT IS OZONE?

Ozone (O_3), sometimes called "activated oxygen", contains three atoms of oxygen rather than the two atoms we normally breathe. Ozone is the second most powerful sterilant in the world and can be used to destroy bacteria, viruses and odors. Interestingly ozone occurs quite readily in nature, most often as a result of lightning strikes that occur during thunderstorms. In fact the "fresh, clean, spring rain" smell that we notice after a storm most often results from nature's creation of ozone. However, we are probably most familiar with ozone from reading about the "ozone layer" that circles the planet above the earth's atmosphere. Here ozone is created by the sun's ultra-violet rays. This serves to protect us from the ultra-violet radiation.

HOW DOES OZONE WORK?

While ozone is very powerful, it has a very short life-cycle. When contaminants such as odors, bacteria or viruses make contact with ozone, they are destroyed completely by oxidation. In so doing, that extra atom of oxygen is consumed and there is nothing left...no odor...no bacteria...no extra atom, only oxygen. Ozone reverts back to oxygen after it is used.



DO YOU HAVE DISTRIBUTORS NEAR MY LOCATION?

All rental units are shipped out of our Sioux Center, IA warehouse. We have several shipping methods available (UPS, USPS, FedEx), including overnight shipping. You may chose to have your item arrive.

HOW LONG DO I GET TO KEEP THE UNIT?

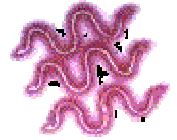
Ozone Solutions offers **two** and **seven**-day rental periods. In either case, you get to use the unit for the full rental period. In other words, shipping times do not count against you.

If you decide you'd like to keep the unit longer than the original rental period, please e-mail or call us and we will be happy to work something out.

HOW IS OZONE PRODUCED?



There are basically two methods of producing ozone...ultra-violet and corona discharge. Corona discharge creates ozone by applying high voltage to a metallic grid sandwiched between two dielectrics. The high voltage jumps through the dielectric to a grounded screen and in the process, creates ozone from oxygen present in the chamber. Ultra-violet (UV) light creates ozone when a wavelength at 254 nm (nanometers) hits an oxygen atom. The molecule (O_2) splits into two atoms (O), which combine with another oxygen molecule (O_2) to form ozone (O_3).



HOW LONG DOES THE OZONE LAST?

As soon as ozone is formed in the generator and dispersed in a room, some of it reverts back into oxygen. This step occurs by several processes including the following: Oxidation reaction with an organic material such as odors or smoke. Reactions with bacteria etc., which again consumes ozone by oxidation reactions. Additionally ozone itself has a half life which means that "residual" ozone created (extra unneeded ozone) will return to oxygen usually within 30 minutes, in amounts equal to half its level. What this means is that after each subsequent 30 minute period there would be half as much residual ozone left at the end of the period as was present at the beginning of the period. This is similar to a geometric progression of 16;8;4;2;1. In practice the half life is usually less than 30 minutes due to temperature, dust, and other contaminants in the air. Therefore, ozone, while very powerful, doesn't last long. It does its job and then disappears.

CAN I OPERATE THE UNIT WHEN PLANTS, ANIMALS, OR PEOPLE ARE IN THE HOUSE?

Pets, plants, and people should not be in an area where an ozone treatment is taking place. However, if you can isolate an area of a home or other building by closing doors and windows, it is possible to treat an unoccupied **part** of an otherwise occupied building.

To isolate an area, make sure that all doors and windows are closed. Place bathroom towels under doors to reduce air movement under the door. If there is a furnace or air-conditioning intake in the treatment area, be sure to keep the furnace or air-conditioning unit off. Otherwise, ozone will be distributed into occupied areas through that system.

WILL THE ODOR COME BACK?

In most cases, **no**. If ozone is applied properly it destroys (oxidizes) the source of the odor. However, in the case of mildew, the odor will return if you are unable to prevent the moist environment that is the source of the mildew.

Sometimes odor sources are physical objects (such as an animal carcass, rotten food, or a leaky container), which will continue to off-gas the odor. In those cases, ozone will only remove the odor temporarily. For permanent odor removal, ozone should be applied **after** the off-gassing object has been removed or cleaned up.

HOW DOES OZONE HANDLE TOBACCO SMOKE?



It eliminates the irritation caused by phenol gasses, by oxidizing them. Phenol gasses are the invisible part of tobacco smoke that causes such discomfort to one's eyes and create the offensive odors. Ozone rids any environment of the effects of smoke completely, rather than merely filtering out the visible particles.

WHERE SHOULD I PLACE THE OZONE GENERATOR?

The best location depends on the nature of the odor. If the odor is emanating from a single location, place the generator as close as possible to the source of the odor.

If you are trying to treat an entire building at once, it is very important to have air flow from the location of the generator to every other place in the building. An easy way to do this is to place the ozone generator near the air-intake for the furnace and/or central air-conditioner. Turn on the furnace or air-conditioner fan to distribute the ozone throughout the building.

If there is no way to move air from the ozone generator to every other part of the building, periodically moving the generator from room to room will be necessary.

WILL OZONE REMOVE STAINS?

No, ozone will not remove the stains. Ozone will deodorize and help to decontaminate the problem but will not remove the actual substance.



WILL OZONE AFFECT ELECTRONICS, FABRICS AND PAINTINGS?

No, ozone will not affect personal computers, fabrics, leather furniture or paintings. The concentrations are not high enough, even during shock treatments for long periods (> 30 days) of time.



WHAT IS THE RIGHT LEVEL OF OZONE?

The right level is when all the generated ozone is being consumed. This only applies to continuous ozone use in occupied environments – not for shock treating. However, this is difficult to attain because it becomes a balancing act. Initially the machine's output is set high to get rid of the problem odor as quickly as possible. As this is being accomplished less ozone is required for the diminishing odor etc., thereby leaving some residual ozone in the air. If the machine output is not turned down, then more residual ozone will remain. If a strong smell of ozone is noticed, then there is more ozone present than is required. Simply turn the rheostat (output level control) down. With ozone, *more is not considered better*.

NOTE: It is not necessary that ozone be detected by humans for it to be effective. Ozone can work even when humans are not able to smell it.

IS OZONE HARMFUL AND WHAT IF ANY ARE THE LONG TERM EFFECTS?

Ozone has been known for almost a century, so a great deal is known about it. Several regulatory agencies, including the Occupational Safety and Health Administration (OSHA), have stipulated that the safe allowable level of residual is 0.10-ppm (parts per million). Note that this permissible level is for continuous exposure throughout an entire 8 hour day for 5 days a week. The temporary affects of such a low exposure would range from headaches, to sore throats, irritation in the eyes, and nose. No long term effects have ever been documented from ozone exposure. Ask Ozone Solutions for Material Safety Data Sheets (MSDS) sheets if desired.



WHAT ARE THE APPLICABLE REGULATIONS REGARDING OZONE?

In the states, OSHA regulates two levels for ozone exposure. They are 0.10-ppm time weighted average (TWA) for an 8-hour day, and 0.30-ppm for 15 minutes. In Canada, guidelines vary by province. The best concentrations for continuous use are in the range of 0.01 - 0.03-ppm, which is well within the guidelines.

HOW DO I SET THE OZONE LEVEL FOR LONG TERM USE, AND WERE DO I PLACE THE UNIT?

1. Set ozone to a setting where you can barely detect ozone after an hour of operation.
2. If ozone is still detected in 15 minutes reduce ozone setting, if the disagreeable odor is still prevalent, increase ozone setting. Properly adjusted, neither ozone or the objectionable odor should be detected.

CIRCULATION: Air circulation is an important factor in how effective ozone works. An oscillating fan can be placed next to generator for proper circulation. **MOUNTING:** The generator can be mounted anywhere in the room. It does not necessarily have to be in a high location to evenly dissipate the ozone.