The Bio3Blaster Ozone Generator Owner's Manual Version

We Appreciate and Thank You!

For purchasing one of our **Bio3Blaster** Ozone Generators.
We appreciate all of your business.

For questions or topics not included in this Owners Manual please feel free to call us and leave a message with your question.
We will be glad to get back with you, quickly via a live human being to answer your question if possible.

Your business, is super appreciated and valued by us and our team.

This book is written for the average buyer, it is not technical, and it is not meant to be a substitute for due diligence.

*****Odor removal and mold remediation are complex topics and this primer is only about the basics, and is not intended to substitute as a business training manual. If you are interested in starting an ozone business I recommend that you invest in one of our business opportunity products.

The "Readers Digest Condensed version for those who don't have the patience to read the whole thing":
If you don't have the time to read the whole thing here are the basics, to read before your first use.

Here are the Golden Rules of using our ozone machines for High Ozone Shock Therapy:

1."Remove the 3 P's from the areas to be treated; NO PEOPLE, NO PLANTS, NO PETS!
2.Run the machine ONLY in an UN-OCCUPIED space.
3.Buy a timer and plug the machine into the timer every time you use it.
4.Set the machine to turn OFF 3 HOURS before returning to the space, every time you use it.

"NEVER EVER breathe more ozone than .05 parts per million".
How can I tell how much is safe? If you smell it and its uncomfortable its too much: as my child hood friend Tucan Sam says **"Follow your nose, it always knows".** Before Your First Use

The Science of High Ozone Shock Treatments™...How the Bio3Blaster Works :

The **Bio Blaster** like all ozone generators, functions, on simple, scientific principles.

Ozone is created in nature in the upper atmosphere every time there is a lightning storm.
Ambient atmospheric oxygen O2 is converted into O3 when it comes in contact with high frequency (voltage) electricity.
The way that ozone eliminates odors or VOC s (and kills bacteria's & mold) is via oxidization.

Did you ever pour hydrogen peroxide on a cut?

Hydrogen peroxide is H2O2, or H2O+O.

When you see it begin to fizz, you are literally watching the oxygen molecule, O, break off of the water molecule, H2O; after the reaction what is left is simple water, or H2O.

As the oxygen, breaks of the water molecule, via free radical oxidization, the microbe or germ is killed or destroyed.

Ozone is the gaseous equivalent of hydrogen peroxide; instead of being O2, pure oxygen, it is O3, O2 +O, or ozone gas.

When it encounters a germ or VOC (odor) it immediately begins to oxidize it, just like hydrogen peroxide. In fact ozone gas kills bacteria and mold 3,125 times FASTER than chlorine bleach!

The really neat thing is that within 30 minutes of the machine being turned off, all that is left is simply pure Oxygen, as the singlet or free radical oxygen has a very short half-life.

The **Bio Blaster** product line of ozone machines have many benefits over the rest of the ozone machines for sale on the marketplace, but the principle difference is more electricity per cell, higher quality dielectric media, more air power, higher output, and durability.

The basic principle of how the machines work is to completely fill a given space with the gas, in order to saturate even the tiniest nooks crannies crevices and cul de sacs. Our machines produce True Ozone Output™ or Actual Ozone Output™. Many manufacturers of ozone machines make ridiculous claims of high output like "16,000 mg/ph" but then employ only 4,000 volts to the cells. Mg/ph means milligrams per hour.

The industry rule of thumb is you get 1 mg/ph for every volt of electricity employed; so if you want 16,000 mg/ph then you would need 16,000 volts provided by your transformer or transformers.

For example a 4,000 volt transformer simply cannot generate more than 4000 milligrams per hour, period.

In our machines there are 1000 volts of electricity for every 1000 mg/ph, claimed; in other words our 20,000 mg/h machine generates 20,000 volts and 20,000 mg/ph, (humidity can affect output slightly).

High Ozone Shock Treatment™ v. Ozone Emitting Air Purifiers
Understanding ozone machines can be quite confusing. In order to eliminate the confusion here are the basics:

The US EPA regulates Air purifiers that produce small amounts of ozone (mg/ph in the hundreds) are used to pump just enough ozone into the room to make it smell better. In order to be used while people are present in the room, they cannot produce over .05ppm. These air purifying ozone generating machines produce levels of ozone that are considered safe to breathe.

On the other hand High-Ozone Shock Generators™ (thousands mg/ph) like the **Bio Blaster** produce extremely high levels of ozone to saturate an entire room or structure with high enough ozone concentrations to oxidize & treat the source of the odor, the VOC's mold & bacteria themselves.

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Just imagine the difference is like treating the symptom v. the root cause of the disease itself.

MG/PH…

MG/PH means „milligrams per hour , or the amount of ozone (in milligrams) an ozone generator produces over a given one hour period of time. The higher the milligrams per hour the more ozone it produces in an hour's time. Ozone has a half-life of about 30 minutes, it immediately starts reverting back to oxygen; in other words as soon as is it produced it begins to dissipate.

This means that there is a direct relationship between MG/HR and the size of the room or structure you can treat effectively.

The more MG/PH the larger the area you can effectively treat.

Our **Bio3Blaster** ozone machines are right for any problem from small homeowner to large commercial projects ask our rep which machine is right for you!

Instructions For Use:

Getting Ready: What you should do prior turning your **Bio3Blaster** on.

Use Only in Un-occupied Spaces and Eliminate the Three P's: NO PEOPLE, NO PLANTS, NO PETS!!!!!

Before you treating any room or structure it is essential to evacuate the area of the Three P's (People, Plants, and Pets) ozone is unsafe to breathe, it can damage the linings of the lungs. We recommend evacuating the entire property during treatment. *never plan on operating your **Bio3Blaster** in one part of the home while people are present in other areas of the home, without sealing off the room being treated by Turning off the HVAC system, shutting (and sealing the bottom of) doors, closing vents etc., (blue painters tape works well

for this purpose) this will assist in preventing the ozone gas from leaking into other parts of the home.

Protect or Remove Sensitive Electronics Valuables, Etc.

There is a ton of confusing information online about ozone damaging materials. A rule of thumb established by the scientists at Los Alamos National Laboratory for high ozone shock treatments is that you never run the machine for over 16 hrs in order to avoid damaging sensitive electronic storage media. We however recommend that you never run the machine for more than 8 hours at a time, in order to avoid such damage. When the study was performed the year was 2002 and there were a lot more floppy storage and magnetic tape media devices than we have today, and professionally in our mold business we have never had this arise as an issue. A rule of thumb for safety however, is that, you cover or **remove** anything from the area being treated that is valuable to you. It is therefore a cheap insurance policy to remove computers and valuables or cover them with something plastic to minimize penetration into the case.

The effort that it takes to cover or remove an item, which has actual or sentimental value is always worth it. By eliminating the valuable you can know with 100% certainty that something of value or concern will not be affected; is a cheap insurance policy which will let you or the homeowner rest assured and sleep peacefully, since it cannot be affected.

Now that we have covered our behinds, we have **never** had a situation where ozone damaged any solid materials if prepared in the above fashion. For liability purposes we always recommend that computers. Valuable electronic devices, paintings etc. be removed. Typically it ok to leave the clothes, furniture, and everyday consumer and household items. The exception to the rule is natural fur. All natural fur should be removed from the area being treated.

Don't Close Off the area being treated!

The most common mistake made when performing a High Ozone Shock Treatment™ is to seal off the area being treated while running the machine. This is a big no-no. Why? Because the area being treated needs a fresh supply of oxygen. The way the **Bio3Blaster** creates ozone is to convert ambient atmospheric oxygen (air) into O3 gas. It uses high voltage electrical current in order to do this. If the machine is used in a confined or closed off space it will quickly convert the ambient oxygen (O2) into O3 just like lightening does in the upper atmosphere. When it runs out of oxygen it will begin to work on or bond the nitrogen in the ambient air and can make nitric oxides and free radicals. There is a lot of dis-information and marketing gobbled-gook surrounding this

simple science. Manufacturers of UV light ozone machines make outrageous claims about the fact that their machines will not produce nitric oxides, and they are correct. However what they won't tell you is that their machines will not produce high levels of ozone either, the kind of levels necessary to perform High Ozone Shock Therapy™ either!

In order to avoid this mistake simply crack open a window in the area to be treated. This will provide ample atmospheric oxygen in order to supply the **Bio 3Blaster** with plenty of oxygen (O2) to convert! While it may sound counterintuitive the fact remains that the science behind the strategy is sound. Alternatively if you've purchased the Ozone Duct Hose™ Zapping attachment* it is possible to leave the **Bio3Blaster** in an untreated or oxygen-rich area and blow the ozone into the area to be shocked via the Ozone Duct Hose™. This allows the ozone to be generated in an oxygen rich environment while pumping it into the area to be treated.

Remember Ozone is heavier than air

You should always put your Bio Blster in the center of the area under treatment. High Ozone Shock Therapy™ works by allowing the gas fully to penetrate or saturate all of the air in the entire space.
Since ozone is heavier than air it should either be placed high up in the room or as close to the cold air return as possible and turn on the HVAC blower. One easy way to do this is to use the over the door hook to hook to get the machine up high without the use of a ladder. If placing, up high, it is advisable to turn on all ceiling fans and / or introduce one or two box fans to circulate the gas due to the fact, that ozone gas is heavier than air. This compensates for the heavier gases natural inclination to seek the lowest areas in the room. We often place the **Bio Blaster** on a ladder, or on top of our air scrubber during our mold remediation projects.
This is not crucial but will improve performance.
*Use Air Duct Ozonation™…

One of the best ways to treat your entire home is to use your **Bio3Blaster** with the Air Duct Hose through the HVAC system. Allowing the ozone to be distributed evenly throughout the home and treating the insides of the ducts at the same time is highly recommended. If you live in a warm area of the country and frequently rely on your air conditioning system, in our opinion, routine duct treatments are a must. In fact the ability to treat your ducts frequently is worth the entire purchase price of the product! In warmer climates, especially, HVAC installers often use substandard ductwork made of fiberboard or flex duct. These products **cannot be effectively mechanically** cleaned and the **gas** is the most effective way to treat these types of systems.

Humidity can reduce the efficacy of Ozone production:
Humidity levels over 50% reduce the amount of ozone that can be created. Our ozone machines do use the most efficient corona discharge available and we routinely use them in high humidity, water- damaged environments during our mold remediation projects, so this is a recommendation only.

However for optimum ozone generating efficiency; you should attempt to lower the humidity levels of the room or space to be treated. De-humidifiers will help dry the affected area to maximize output.

Complete Saturation is the Key to Successful Treatment:
When performing High Ozone Shock Treatment™ each project will be different, the complete success of every use depends on your ability to accomplish one critical task… saturating the treatment area in question with high concentrations of ozone gas for a prolonged duration of time.

Warning: We do not operate an odor removal business, so we do not offer specifics; our professional use is confined to a specific protocol for mold remediation, created by scientists at Los Alamos National Laboratory.

How Long Should I run the Bio3Blaster?

Every project is different with many variables, we do not offer a protocol for your need as ozone fills far to many niches..
We provide suggestions only… But understand to discover the optimum protocol for each individual use you must rely on your own trial & error, and experimentation.

Look here find the chart for *your* machine to get your project started…

NEVER RUN THE MACHINE FOR MORE THAN 12 HOURS IN A GIVEN AREA!!!!!!!

NOTE: Cigarette smoke is one of the most difficult odors to get rid of please use it longer in order to break down the residue that accumulates on the ceiling and walls at the molecular level.

NOTE: It may take up to an hour to get ozone to kill concentrations, depending on the square footage.

RUGGED HOME 20K UNIT:

Degree of Smell:	Minor	Medium	Extreme
Size of Room 100sq/ft	15min	30 min	1 hour
250 sq/ft	30min	1 hour	1.5 hours
500sq/ft	1 hour	1.5 hours	2 hours
1000sq/ft	1.5 hours	2 hours	2.5 hours
1500sq/ft	2 hours	2-2.5 hours	3 hours
2000sq/ft	3 hours	4 hours	6 hours
2500sq/ft	4 hours	6 hours	8 hours

STERLING XT PRO, AUTO SANITIZER, OZONE DRAGON or VERTICAL 20K- 50K UNIT:

Degree of Smell:	Minor	Medium	Extreme
Size of Room 100sq/ft	10 min	20 min	40 min
250sq/ft	20 min	40min	1 hour
500sq/ft	40min	1 hour	1.5 hours
1000sq/ft	1 hour	1.5 hours	2 hours
1500sq/ft	1.5 hours	2 hours	2.5 hours
2000sq/ft	2.5 hours	3.5 hours	4 hours 2500sq/ft
3.5 hours	4.5 hours	6 hours	

Vertical Tornado Pro 80-100K UNIT:

Degree of Smell:	Minor	Medium	Extreme
Size of Room 100sq/ft	5 min	10min	20 min
250sq/ft	10 min	20min	40min
500sq/ft	20min	40min	50min-1 hour
1000sq/ft	40min	50min-1 hour	1 hour 15 min
1500sq/ft	50 min1 hour	1 hour 15 min	1.5 hours
2000sq/ft	1 hour 15 min	1.5 hours	2 hours
2500sq/ft	1.5 hours	2 hours	3 hours
3000sq/ft	2 hours	3 hours	3 hours
5000 sq ft	2.5 hours	3.5 hours	4 hours
6000 sq ft.	3 hours	4 hours	5 hours

For 60k and higher rated professional machines contact a representative to discuss your specific application

Minor Smell: noticeable, probably non-toxic, unlikely to cause health risks, unpleasant at worst (ex: moderate cigarette odor)

Medium Odors: obvious & striking, unpleasant, is not comfortable live in space (ex: mold odors, MVOC's)

Extreme Odors: pose potential health risks, impossible to be inside, extreme odor (ex: Decay, Strong mold or bacterial smell, animal feces, vomit, urine, strong chemical smells, VOC's)

Cigarette Smoke Odors: In order to eliminate cigarette odors the odors need to be treated for much longer time frames than other odors due the residues that accumulate on the walls ceilings and in carpets and fabrics. The smoke can be treated effectively and the by machine WILL WORK. You must run the machine for longer periods of time than other odors as the physical residue must be broken down at the molecular level. Start by doubling the times listed but never exceed the maximum time limits. You may need a follow up treatment which can be done the very next.

Once you complete the first treatment if odor persists wait 12 hrs minimum then repeat. Repeat over and over until the odor disappears.

If area is < 100sq/ft ...

Many projects, such as cars, Small sheds boats, and closets are < 100sq/ft. For small projects we recommend the Bio3Blaster duct hose and port attachment for optimal O2 conversion to O3, or using the Home junior 10k model

If area is bigger than 1000sq/ft...

For Projects > 1000sq/ft we recommend using the **Bio3Blaster STERLING XT PRO** Models or more than 1 Home unit at once (1 per 1000sq/ft) or multiple uses made while sectioning off the areas in question.

If area is bigger than 2000sq/ft...

If area is greater If a home is > 1000sq/ft for example, use the **STERLING XT PRO 20-50K.** This creates adequate concentrations of ozone necessary for oxidation, in High Ozone Shock Treatments™.

If area is bigger than 3000sq/ft...

If area is greater If a home is > 3000sq/ft for example, use the **STERLING XT PRO 20-50K.** Models in different rooms/different levels. This creates adequate concentrations of ozone necessary for oxidation, in High Ozone Shock Treatments™.

If area is bigger than 4000sq/ft...

For areas Greater than 4000 square Feet use the **Bio3Blaster Vertical Tornado ™ 30k.** These unit will fill up the space fast with ozone gas and is very sufficient for huge commercial spaces. You can use 3 Homes 15k or 2 Rugged Pro 2x as well(Silver Cannon)

*** For other models types, please contact us directly.*

Mold Problems and Their Effective Treatment...

Mold should always be considered and extreme odor. If you have a mold problem we highly recommend that you visit www.safemoldsolutions.com and consider purchasing one of our do it yourself home mold removal kits. Mold is a potential pathogen and can be deadly. Many other ozone manufacturer or machine builders will tell you just turn on the ozone and the mold will turn to ash or some other such nonsense. Mold needs to be handled in a very specific fashion in order to minimize cross contamination and health risks to those individuals brave enough to attempt the clean up. A rule of thumb is if the area of flowering mold is bigger than a 10 x 10 area; hire a professional certified mold remediation or call 1-800-948-4947, (216)-303-0853. In fact many mold professionals are as inept as the average home owner, or more so, having received poor training.

Please call us if you have questions finding a safe mold professional to hire in combination with ozone to effectively eliminate mold and mold spores.

Tips for Completing Successful High Ozone Shock Treatment™...

Cat Urine and urine in general are both Extreme odors. Since ozone is a gas it cannot penetrate into solid surfaces. It is a good idea to use a urine-specific enzyme based product, to saturate the affected area first following manufacturer's guidelines.

For spot treatment use either our Oxy-Green Carpet machine or cover the area to be treated with a plastic tarp, leave an air gap of at least a foot, between the tarp and what is being affected

Caution: to completely eliminate the risk of over exposure to ozone please use a carbon/charcoal filtered p-100 protective/ventilated face mask,

Special Instructions...

Sanitizing:
While working with the head engineers at the largest transportation company in the world we developed a sure fire sanitizing protocol.
It works the same in any space.
First, pre-clean the area removing gross dirt and debris.
Next set up the machine and the ozone meter.
To examine the meter from outside of the containment and to prevent the need for expensive meters use two cell phones and video call one using face time or other means. Point the camera towards the digital output screen of the ozone meter. When the machine hits 6 ppm hold the ppm for 30 minutes.
The space should now be sanitized.
Future treatments can be made using the recipe generated by the above testing method developed recipe for subsequent treatments.

For **Super Auto Sanitizer**, first insert the output machine roll up the window onto the end of the hose and then run the gas from the outside of the car to the inside with the air on re-circulate. Follow the above steps to create the same formula for treatments.

Always Use An Automatic On/Off Digital Timer
We recommend that all users immediately purchase a simple heavy duty digital on off timer for use with the **Bio Blaster** We specifically do not incorporate timing mechanisms into our machines for a very simple reason. In our Mold Removal business we have had the opportunity to use virtually every other ozone competitor's machines. The more feature especially digital that are

incorporated into the unit the more likely the unit is to break or fail. If the timer is built inside the machine that means that the machine is down and cannot be used and it must be shipped back in order to be repaired. Broken machines can lose money for a serious contractor or professional and they can frustrate the average homeowner. If your separately purchased external timer fails just go to Home Depot or any hardware store and buy a new one to plug the machine into. Voila problem solved.

WARNING: Exposures to high levels of ozone can hurt your lungs-heed the recommendations below!

It is recommended that the machine gets plugged directly into the timer and that you **set it to turn off *at least* 3 Hours prior to entering the treated space, otherwise a charcoal filter respirator must be worn!!!**

Keep Breathing Fresh Clean AIR or Whole House Air Duct O3 Treatment with our

Air Duct Hose Attachment:

Early last year the National Association of the Duct Cleaners of America, **NADCA**, issued a **ban** on the use of chemical sanitizers in air duct systems. The reason is that with the old way which involved fogging a chemical directly into the ducts there was no way to completely sanitize the air ducts or ensure that the product was delivered along the length of the inside if the ducts.

For that reason I developed the Oxy-Green™ Duct Sanitizing Machine™ to take the place of the gap in technology. It allows ozone gas to be pumped directly into the air duct system killing all of the surface viruses bacteria and mold spores that can hide in the crevices in an air duct system.

Now *all* of our rugged tool box models can accept an Ozone Duct Hose™ Or Remote Area/ Confined-Spaces Attachment™. This allows the average homeowner to be able to sanitize their ductwork at will.

It is also good for pumping ozone into an area to be treated as it can be used to positively pressurize a small space with ozone gas. It is ideal for cars boat and many, many, other applications.

Wrapping up: completing a High Ozone Shock Treatment™ with your new Bio Blaster

Always use a timer to turn off your new Bio3Blaster

We absolutely recommend the use of a simple digital timer with your new **Bio3 Blaster** in order to turn off the machine 30 minutes prior to returning to the area under treatment. This will ensure that your are breathing pure oxygen rather than Activated Oxygen or O3 Gas.

Ozone reverts back top pure oxygen in about ½ hour to one hour.

If you need to accelerate the evacuation of the gas from the area being treated, first don a p-100 rated respirator with charcoal or carbon filter that is sufficient for harmful vapors.

It is highly important that the respirator fits properly, so be sure to refer to manufacturers guidelines for use.

After donning the face mask, you can enter the area under treatment and open the windows and doors or turn on exhaust fans, in order to exhaust the gas and normalize indoor air quality more effectively.

I treated the area but the odor still exists:
If after performing the treatment the odor has not been eliminated then it is a good idea to repeat the procedure again. If the odor still persists it is likely that you must still perform source removal.
Source removal means eliminating the cause of the issue.

Many different sources create odors, so this manual cannot cover the myriad of treatments necessary for source removal.

It is also possible to set the machine up for routine recurring treatments.

Many of our customers run their ozone machines on a re-curring basis, use the timer on a daily or weekly burst setting. This allows the machine to turn on again for a set period of time; for example to turn on once a day while you are at work for 15 minutes, or any other arbitrary time you desire.

WARNING: Remember these machines are for use in UNOCCUPIED SPACES ONLY!!!

Electrical Device Hazard Warnings:

The Bio Blaster is an electrical device, as with all electrical please take appropriate safety measures while operating this device. Never operate near water.

For use only by adults, never allow a child to operate this equipment:

Never use near, flammable materials or allow them to enter the inlet end of the machine

Never operate on or near any flammable objects liquids or materials.

Never service the unit yourself except to clean as this voids the warranty. Never run continuously for more than 12 hours in a row.

Always follow common-sense, pre-cautions when using the **Bio Blaster** or any other electrical device. If there are any questions concerning potential risks of using this electrical device, please contact us by phone or email before attempting.

Maintenance

The only maintenance required is to clean the generator cells if they become dirty or to change the filters on the air inlet ports.

Cleaning the generator cells is quite easy and can be accomplished using alcohol and cotton balls.

Simply remove the two screws that hold the cell array in place and lift out the pack; pull gently on the plate and it will come off the dock completely. Some models may not have this feature and we have videos posted to show care of the various models.

The plate can then be wiped down and replaced.

Changing the plate is just as simple.

Our Service Policy

As builders of the **Bio3Blaster** we have a USA Based Service department you can trust for all repair issues.

If for any reason the machine fails to function in the first year, just send it back and we will repair it or replace it for free.

If you need service afterward just send it to us for a flat rate rebuild, or order new generator cells and replace, yourself this may void your warranty.

Disclaimer

The information contained herein is based on our own experience using ozone for mold remediation. We are not in the odor removal business the information on odor removal has been gleaned from our customers.

WARNING NOTICE: We assume no responsibility for the use or mis-use of this machine on your own or others projects.

NOTICE: By purchasing this machine the user accepts all risks associated with use and mis-use of the same.

We recommend that all users wear properly fitted carbon filter chemical vapor respirators in conjunction with the manufacture of ozone gas and its evacuation.

We recommend that this machine only ever be used in a environment devoid of people plants and pets.

We recommend never using this machine for more than 12 hours at a time.

We recommend the removal of all valuable objects from area of treatment prior to use.

We recommend reading all information regarding ozone and its use.

Thank You

Thank you for choosing The Bio3Blaster
We anticipate with pleasure helping you with your odor & mold removal project.

Bio3Blaster Sales

4456 Abbe Road STE 103

Sheffield Village, Ohio 44054

1-800-240-8514 www.bestozonegenerator.com;

www.ozonegenerator20000.com

SAFETY DATA SHEET for OZONE

(Formerly MSDS)

1. PRODUCT IDENTIFICATION Product Name: Ozone **Common Names/Synonyms:** Triatomic Oxygen, Trioxygen, O3

Ozone Generator Supplier

Oxyzone Enterprises website: www.ozonegenerator20000.com 4456 N. Abbe Rd. #103 email: industrialozone@gmail.com Sheffield Village, Ohio

800-240-8514

Product Use: This SDS is limited to ozone produced in gaseous form on site by an ozone generator, in varying concentrations in either air or aqueous solution, for the purposes of odor abatement, oxidation of organic compounds, or antimicrobial intervention, in a variety of applications, from food processing to groundwater remediation.

2. HAZARD IDENTIFICATION

GHS Classifications: Physical Hazards Health Hazards Environmental Hazards

(Acute & Repeated Exposures)

NOTE: Severe respiratory toxicity will develop before skin or eye irritation go beyond listed categories. ***Anyone with chronic pulmonary problems, especially asthma, should avoid exposure to ozone.***

WHMIS Classifications (Workplace Hazardous Materials Information System, Canada)

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Oxidizing Gas Skin Irritation – Category 3 Acute Aquatic Toxicity – Category I

Eye Irritation – Category 2B

Respiratory Systemic Toxicity – Category 1

D1A	Acute lethality – Very toxic, immediately	C	Oxidizing
D2A	Chronic Toxicity –Very Toxic F	Dangerously	Reactive

D2B Mutagenicity – Toxic

Chemical name Ozone

3. COMPOSITION

Chemical Formula CAS Registry Number **4. FIRST AID MEASURES** **Route of Entry** Skin Contact YES Skin Absorption NO Eye Contact YES

Ingestion NO Inhalation YES

First Aid

Rinse with water

NA

Rinse with water, remove contacts

Triatomic oxygen, trioxygen O3 10028-15-6

Symptoms

Irritation NA

Irritation

NA

Headache, cough, dry throat, heavy chest, shortness of breath

For severe cases, or when symptoms don't improve, seek medical help.

5. FIRE FIGHTING MEASURES

While ozone itself is not flammable, it is a strong oxidant and may accelerate, even initiate, combustion, or cause explosions. Use whatever extinguishing agents are indicated for burning materials.

6. ACCIDENTAL RELEASE MEASURES

Turn off ozone generator, and ventilate the area. Evacuate the area until ozone levels subside.

7. HANDLING AND STORAGE

Ozone must be contained within ozone-resistant tubing and pipes from the generation point to the application point. Any leaks must be repaired before further use.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

NA

Remove to fresh air, provide oxygen therapy as needed

OSHA Permissible Exposure Limit: 8 hour Time Weighted Average **0.1 ppm** ANSI/ASTM: 8 hour TWA **0.1 ppm**, Short Term Exposure Limit **0.3 ppm** ACGIH: 8 hour TWA **0.1 ppm**; STEL **0.3 ppm**

NIOSH: Exposure Limit Ceiling Value **0.1 ppm** light; **0.08 ppm** moderate; **0.05 ppm**, heavy; Light, moderate, heavy work TWA <= 2 hours, **.2 ppm**

Immediately Dangerous to Life or Health **5 ppm Respiratory Protection**: Use full face selfcontained breathing apparatus for entering areas with high concentration of ozone. **Engineering controls**: use ozone destruct units (thermal and/or catalytic) for off gassingozone.

Physical state Molecular Weight

Appearance

Odor Odor

threshold

Gas 48.0

pH NA

Flash point

NA

Evaporation rate NA

Flammability NA Explosive limits NA

9. PHYSICAL AND CHEMICAL PROPERTIES

Clear at low concentrations, blue at higher concentrations

Distinctive pungent odor

0.02 to 0.05 ppm; exposure desensitizes

Melting point Boiling point

Vapor pressure Vapor density

Solubility in water

-193 C/-315 F		-112 C/-169 F					
>	1	atm	1.6	(air	=	1)	
570	mg/L	@20 C,	100%	O3;	0.64	@0 C	(vol/vol)

Relative density	Partition coefficient	Auto-ignition temperature	
Decomposition temperature	Viscosity		
NA	NA		
NA	NA		
NA			

10. STABILITY AND REACTIVITY

Ozone is highly oxidizable and decompose	unstable substances, aromatic compounds, dintrogen tetroxide, tetraluorohydrazine. under normal	and highly including rubber, nitrogen Ozone will ambient	reactive. alkenes, dicyanogen, trichloride, readily react temperatures.	Avoid contact with benzene and other bromine diethyl ether, hydrogen bromide, and spontaneously
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11. TOXICOLOGICAL INFORMATION

Likely routes of		exposure:	inhalation,	eyes, skin	exposure.				
Effects of dry possible exposure also	Acute throat,	Exposure: shortness pulmonary intensify possible.	Discomfort, of breath, edema/fluid symptoms.	including heavy feeling in the Irritation	headache, in chest lungs); higher of skin	coughing, (including levels of and/or eyes	is
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Effects of Chronic Exposure: Similar to acute exposure effects, with possible development of chronic breathing disorders, including asthma.

Inhalation LC50: mice, 12.6 ppm for 3 hours; hamsters, 35.5 ppm for 3 hours Irritancy of Ozone YES

Sensitization to Ozone	NO
Carcinogenicity (NTP, IARC, OSHA)	NO
Reproductive Toxicity	Not Proven
Teratogenicity	Not Proven
Mutagenicity	Not Proven
Toxicologically Synergistic Products	Increase susceptibility to allergens, pathogens, irritants

12. ECOLOGICAL INFORMATION

The immediate surrounding area may be adversely affected by an ozone release, particularly plant life. Discharge of ozone in water solution would also be harmful to any aquaticlife. Due to natural decomposition, bioaccumulation will not occur, and the area affected would be limited.

13. DISPOSAL CONSIDERATIONS

Off-gassing of ozone should be through an ozone destruct unit which uses heat and/or a catalyst to accomplish the breakdown of ozone to oxygen before release into the atmosphere.

14. TRANSPORT INFORMATION

NOT APPLICABLE, as ozone is unstable and either reacts with other substances in the environment or decomposes, and therefore must be generated at the location and time of use.

15. REGULATORY INFORMATION

SARA = Superfund Amendments and Renewal Act

SARA Title III Section302 Extremely Hazardous Substance TPQ: 100 lbs. SARA Title III Section304, EHS RQ: 100 lbs.

SARA Title III Section313: Ozone is reportable if more than 10,000 lbs. are used/year.

TPQ (Threshold Planning Quantity) requires emergency planning activities if this amount is on site at any time during year

RQ (Reportable Quantity) requires any release of this amount into the environment to be reported to the National Response Center

Source: EPA List of Lists

16. OTHER INFORMATION

The half-life of ozone is much shorter in water than in air. Increased temperature in either solvent decreases the half-life. Published research indicates a half-life of 20 minutes for ozone dissolved in water at $20^{O}C$, and a half-life of

approximately 25 hours for ozone in dry air at 24^{O}C (McClurkin & Maier, 2010). The practical halflife time is actually less, especially in air, due to air circulation, humidity, the presence of contaminants or walls with which to react, etc. In many situations, with air movement, warmer temperatures, and normal relative humidity, the half-life of ozone in air could be 1 hour or less. Further, ventilation of a closed space to other areas will also disperse the ozone, so that concentration levels can rapidly decrease after generation ceases.

Source websites: Canadian Centre for Occupational Health and Safety: Chemical Profiles: Ozone http://www.ccohs.ca/oshanswers/chemicals/chem_profiles/ozone/

Haz-Map: Occupational Exposure to Hazardous Agents: Ozone

http://hazmap.nlm.nih.gov/cgi-bin/hazmap_generic?tbl=TblAgents&id=68

International Chemical Safety Cards #0068: Ozone

http://www.cdc.gov/niosh/ipcsneng/neng0068.html NIOSH Pocket Guide to Chemical Hazards: Ozone http://www.cdc.gov/niosh/npg/npgd0476.html United States National Library of Medicine ChemIDplus Lite: Ozone 10028-15-6

http://chem.sis.nlm.nih.gov/chemidplus/ProxyServlet?objectHandle=DBMaint&actionHandle=default&nextPage=jsp/chemidlite/ResultScreen.jsp&TXTSUPERLISTID=0010028156

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