



## Ozone

- Ozone destroys bacteria, mold, and mildew, eliminates spores, yeast, and fungus, and inactivates viruses and cysts.
- Ozone oxidizes and destroys oils and other contaminants in water.
- Ozone can significantly reduce levels of harsh chemicals such as chlorine and bromine.
- Ozone acts as a microfloculant aiding in the removal of minerals such as iron and manganese.
- Ozone is pH neutral. Adds no contaminants.
- Ozone leaves no unpleasant chemical taste or smell.
- Ozone dissolved in water will not irritate skin, nose, or ears, nor will it dry out or leave a chemical film on skin.
- Ozone can reduce chlorine or bromine consumption to a minimum, saving money on maintenance.
- Ozone does not affect the pH balance of water like traditional chemical treatment methods.
- Ozone is less corrosive than chlorine in water.

### What is Ozone?

Ozone was first discovered in the 1840's and is nature's natural purifier. It is a chemical known as O<sub>3</sub> and is produced, in nature, from lightning bolts during electrical storms (it's clean, fresh scent is often noticed after a heavy rain) and by ultra violet rays from the sun. When these rays enter earth's atmosphere, the oxygen in the upper atmosphere is converted into ozone. This is how earth's ozone layer is created. The special ultra violet rays of the sun are simply duplicated using special ultra violet lamps. When air is passed by these lamps, the oxygen is converted into ozone. Ozone is a form of oxygen also known as "active oxygen". It is a natural purifier, created by combining three oxygen atoms and is a strong cleaning, purification and oxidizing agent. As it reacts with organics it oxidizes unpleasant odors, kills germs, bacteria and viruses.

Ozone does not leave contaminants in the water that smell, look or taste bad nor does ozone leave potentially hazardous by-products such as chloramines that can irritate your eyes, dry out your skin, fade swimwear, and damage pool and spa or water storage equipment. In fact, unused ozone reverts back to life-giving oxygen.

By combining the ultraviolet rays from the sun with the air we breathe, ozone is naturally generated. In 1906, the city of Nice, France, built the first municipal water purification plant using ozone. Today, there are over 2,000 plants worldwide using ozone to purify drinking water.

### What are the benefits of Ozone?

Unlike other sanitizers ozone leaves no unpleasant odors or residual chemicals in your spa. Typically, you can go much longer between water changes not to mention reducing your maintenance time and chemical consumption by up to 75%. Ozone eliminates the problems of red and irritated eyes, dry skin, faded swim wear and other problems associated with chlorine and bromine. Ozone also has no effect on the chemical balance of your spas water and will even help in the removal of dissolved minerals, oils and lotions.

### Why does Ozone kill odors, germs, bacteria, and viruses?

One of the oxygen atoms has a weak bond and readily wants to transfer electrons. This allows for the transfer of electrons between the contaminant and the ozone molecule. As a consequence, the ozone molecule will come apart. When the single oxygen atom combines with the other organic substances it oxidizes them causing them to be destroyed and eliminated from the water or air. The by-product of this oxidation process is O<sub>2</sub>, which is oxygen.

### **What is meant by oxidation?**

Oxidation means that a substance undergoes a chemical change resulting in a different substance. A common example of this is rust.

### **What happens to Ozone after it serves it's purpose?**

When it combines with the other organic substances it oxidizes them causing them to be destroyed and eliminated from the water or air. The byproduct of this oxidation process is simple life-giving oxygen.

### **How long does Ozone last?**

The rate at which ozone lasts varies. In air it is directly related to the temperature, altitude, humidity, weather conditions, and availability of reactive substances. Ozone begins to decompose instantly, however it has a half life of 20 to 100 minutes in dry air, at which time it converts back to oxygen if no organic substances are present. In water the rate at which ozone lasts is directly related to temperature and organic content in the water.

### **How does Ozone compare with chlorine or bromine?**

Unlike chlorine and bromine, ozone leaves no harmful byproducts or odors in your water. Additionally, ozone is the strongest commercially available disinfectant, yet very safe, and over 3000 times faster than packaged chlorine for purifying water and is more effective for elimination of e. coli, giardia, legionella, and cryptosporidium.

### **If I use Ozone in my spa water, will I still need to use chlorine?**

Ozone is very effective as a sanitizer, however because of the low doses being produced along with ozone's short life span, **it is improbable that there will be a measurable residual of sanitizer in the water, therefore, it is recommended that you maintain a 1 PPM residual of chlorine to prevent typical algae problems. Using a salt generator all you need to maintain is a 1ppm residual due to the nature of unstabilized chlorine.** With ozone, you will notice that you reduce chlorine or bromine use 40% - 75%, water will feel soft and silky and you won't have problems with faded swimwear, red / irritated eyes, or dry skin. Reduced maintenance time and chemical usage will give you more time to enjoy your pool or spa.

### **What substances does Ozone kill?**

Ozone is known to eliminate the following substances:

- Bacteria - (such as E-coli, salmonella, streptococcus, cholera) . These are micro-organisms about 1/100th the diameter of a human hair and are relatively easy to kill.
- Viruses - (such as influenza, poliovirus, hepatitis). A virus is a parasitic, infectious microbe which can cause disease in humans.
- Parasites - (such as trichina worms, pinworms, amoebae, nematodes and fungi). Parasite eggs are large in microscopic scale and relatively easy to filter out, but are generally resistant to other disinfecting methods.
- Cysts - (such as cryptosporidium and giardia). Cysts are protozoa that produce a special protective shell.
- Chemical by-products in water - such as chloramines and trihalomethenes. Chemical water can leave undesirable odors and taste.

### **At what levels can people begin to smell Ozone?**

Ozone has a sweet smell to it and can be noticed at various levels depending upon their sensitivity, generally .003 to .015 PPM.

### **Isn't Ozone a pollutant?**

Ozone pollution or smog pollution alerts are not the same. This pollution is caused by UV waves striking oxides of nitrogen from auto exhaust and factory emissions.