Bio-Oxygen Air Sterilization for Hospitals/Food Processing/Pharmaceuticals, Medical Ozone Generators, Pioneer in Bio-Oxygen Systems for Food Washing & Storage, Ozonated Water Treatment. Visit us at www.OzonePedia.com

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OZONE IN SWIMMING POOLS

Hello Partner,

We are an engineering organisation, manufacturing Bio-Oxygen Generators since 1995, and are pioneers in exploration of innovative methods for production and calibration of stable and concentrated Bio-Oxygen needed for critical industrial and medical applications.

WEBSITES:

https://OzonePedia.com

https://OxyzoneTherapy.com/

We are **headquartered in India.**

Our international channel partners are in **Taranto-Italy, Canary Islands-Spain, Brisbane-Australia (**https://www.ozonescience.com.au/**),**
Chimbote-Peru, Dubai-UAE & Johannesburg-South Africa.

THE SUPREME PROPERTIES OF OZONE IN SWIMMING POOLS ARE AS FOLLOWS :

- Strongest disinfectant - **3157 times stronger** disinfectant than Chlorine
- Since 1893 (not 1983!), Madrid, Spain has been using Ozone in their municipal water in all applications
- 3157 times better substitute than chlorine - hence **no recurring costs of buying chlorine** daily
- **Increases Dissolved Oxygen (DO)** content in water, making it healthier & safer even if kids consume pool water
- **No toxic residue**
- **No Skin irritation, eye irritation**, etc caused by chemical reagents
- No manpower costs for handling chemicals
- No chemical storage required

- March 12, 1975 - **FDA (USA)** recognized ozone treatment to be a Good Manufacturing Practice (GMP) for the bottled water industry.
- Complete de-colourization & de-odorization (not effectively possible by UV, which is even banned by multiple countries for ill effects on eye & skin).
- Destroys Bacteria/ Virus/ Fungi/ Mould/ Algae
- Fully natural & environment friendly

Team Waterhouse Documentary : https://www.youtube.com/watch?v=8JHoFcRm5HY (Jump to 4:34 minute mark to view Swimming Pool Ozonization)

Benefits of Using Ozone over Chlorine in Swimming Pools

Why swimming pool water is treated?

The water in a swimming pool or spa is nearly always treated by some means or other. The prime purpose of the treatment is to ensure that the water is clean and not detrimental to the health of the bathers. Invariably, water is taken from the pool and filtered. This process removes any solid pollutants in the pool. This cleaning is, however not sufficient. Bacteria, viruses, cysts and organic pollutants are inevitably introduced into the pool water from the air and by the bathers themselves. These microorganisms and pollutants are microscopic or are dissolved in the water. Since these are extremely hazardous to bathers, they must be neutralised or removed from the water. To achieve this, the most common method employed throughout the world is to treat the pool water with chlorine or a chemical that releases chlorine into the water. Chlorine is a fairly effective disinfectant. However, chlorine does have its limits and has several disadvantages. There are a considerable number of micro-organisms that remain unaffected by chlorine. These micro-organisms (such as Cryptosporidium parvum and Giardia lamblia) are extremely dangerous to health, causing severe gastrointestinal infections and other complaints. When chlorine oxidises organic matter in the water (such as urea), amongst the by-products that are formed is a family of chemicals called chloramines.
Chloramines are highly noxious substances that have highly undesirable effects:
• They cause the very unpleasant "swimming pool" smell experienced in many pools.
• They irritate the nose, throats and eyes of bathers and are responsible for the "red eyes" experienced by bathers in many pools.
• They irritate the skin.
• They affect the respiratory system, particularly of small children. They at best aggravate respiratory conditions, such as asthma.
• They attack the fabric of the swimming pool and the building in which the pool is located. Over time, damage is caused to wood, ceramics, steel, concrete and plaster.

Many efforts have been made to replace chlorine, but few of these have gained substantial ground. This is because they have been found to have the same drawbacks (e.g. bromine), or are expensive (e.g. hydrogen peroxide) or are less effective (e.g. metal ion based processes, hydrogen peroxide). Various Disinfectant and their by-products: Desinfectant Organohalogenic desinfection byproducts Inorganic desinfection byproducts Non-halogenic desinfection byproducts Chlorine (Cl2)/ underchloric acid (HOCl) trihalomethanes, halogenic acetic acids, haloacetonnitrils, chlorine hydrates, chloropicrin, chlorophenols, Nchloramines, halofuranones, bromohydrins chlorate (particularly the application of hypochlorite) aldehydes, alkanic acids, benzene, carboxylic acids Chlorine dioxide (ClO_2) chlorite, chlorate unknown Chloramines (NH_3Cl etc.) haloacetonnitrils, cyano chlorine, organic chloramines, chloramino acids, chlorohydrates, haloketons, nitrite, nitrate, chlorate, hydrazine aldehydes, ketons Various disinfection **by product of chlorine**:

- Trihalomethanes
- Chlorinated acetic acids
- Halogenated acetonitriles
- Chloral hydrate (trichloroacetaldehyde)
- Chlorophenols
- MX (3-chloro-4-dichloromethyl-5-hydroxy-2(5H)-furanone).

(a) Chlorine: Free chlorine in drinking-water is not particularly toxic to humans. The major source of exposure to chlorine is drinking-water. Therefore, 100% of the TDI was allocated to drinking water giving a health-based GV of 5 mg/litre for the sum of hypochlorous acid and hypochlorite ion. Based on the taste and odour threshold of free chlorine, it is doubtful whether consumers would tolerate such a high level of chlorine. Most individuals are able to taste chlorine at concentrations below 5mg/litre, and some at levels as low as 0.3 mg/litre. The health-based GV for chlorine should not be interpreted as a desirable level of chlorination. (b) Trihalomethanes The predominant chlorine disinfection by-products are the THMs. Nevertheless, they account for only about 10% of the total organic halogen compounds formed by water chlorination. THMs are formed by the aqueous chlorination of humic substances, of soluble compounds secreted from algae and of naturally occurring nitrogenous compounds (Morris, 1982). THMs consist primarily of chloroform, bromodichloromethane, dibromochloromethane and bromoform. When bromide is present in drinking-water, it is oxidized to hypobromous acid by chlorine: $HOCl + Br^- = HOBr + Cl$HOBr reacts with natural organic compounds to form brominated halomethanes. Similarly, the presence of iodide may lead to the formation of mixed chlorobromoiodo-methanes. Some generalized statements can be made with regard to THMs in chlorinated drinking-water (IARC, 1991; Morris, 1982; Canada, 1993):

- Concentration of THMs in drinking-water varies widely and ranges from not detectable to 1 mg/litre or more;
- THM levels are higher in chlorinated surface water than in chlorinated groundwater;
- Concentrations of THMs tend to increase with increasing temperature, pH and chlorine dosage;
- Concentrations of THMs increase upon storage even after exhaustion of residual chlorine or after dechlorination. This indicates the formation of intermediates products leading to the slow production of THMs;
- Chloroform is usually the most abundant THM often accounting for greater than 90% of the total THM concentration;
- If there is a significant amount of bromide in the raw water, the brominated THMs, including bromoform, may be dominant;
- Formation of THMs can be minimized by avoiding pre-chlorination and by effective coagulation, sedimentation and filtration to remove organic precursors prior to final disinfection;
- Removal of THMs after their formation is difficult and involves resource-intensive processes such as activated carbon adsorption or air stripping. Because trihalomethanes usually occur together, it has been the practice to consider total trihalomethanes as a group, and a number of countries have set guidelines or standards on this basis, ranging from 0.025 to 0.25 mg/litre.

Chloramine and its by-products; Chloramine generally produces by-products similar to those observed with chlorine but at much lower concentrations. An exception to this is the formation of cyanogen chloride, CNCl (Bull and Kopfler, 1991). The use of chloramine as a disinfectant has increased in recent years because of limited formation of THMs, however, little is known about the nature of other byproducts. Monochloramine is about 2000 and 100 000 times less effective than free chlorine for the inactivation of E. coli and rotaviruses, respectively. Monochloramine cannot therefore be relied upon as primary disinfectant. It is useful for maintaining a residual disinfectant in distribution systems. The shift to monochloramine to control THM formation may thus compromise disinfection and the Guidelines caution against such procedure. Organic chloramines are even less effective disinfectants than monochloramine. Chlorine dioxide and its by-products; Because of its explosive hazard, chlorine dioxide is manufactured at the point of use. CLO2 is generated through the reaction of sodium chlorite and chlorine. Chlorine dioxide reactions with humic substances do not form significant levels of THMs. In addition, it does not react with ammonia to form chloramines. The main disinfection byproducts of chlorine dioxide are chloride, chlorate and chlorite. Chlorine dioxide is more effective towards inactivation of Giardia cysts than free chlorine, but less effective towards rotavirus and E. coli. Unlike chlorine, the disinfection efficiency of chlorine dioxide is independent of pH and the presence of ammonia. A provisional GV was recommended for chlorite while no adequate data were available to recommend a GV for chlorate. No GV has been recommended for chlorine dioxide per se because of its rapid breakdown in aqueous solutions and the chlorite GV is adequately protective for potential toxicity from chlorine dioxide. Furthermore, the taste and odour threshold for chlorine dioxide in water is 0.4 mg/litre which constitute a limiting factor and a signal for its presence at higher concentrations in drinking-water. Other reaction by-products of chlorine dioxide with organics in drinking-water have not been well characterized but include aldehydes, carboxylic acids, haloacids, chlorophenols, quinones and benzoquinone. In a recent article, more than 40 organic disinfection by-products were identified in a pilot plant in Indiana which uses chlorine dioxide as a primary disinfectant. The toxicity of these by-products is largely unknown.

The most common health defects because of chlorine are discussed below:

1) Respiratory Defects The respiratory system is the most susceptible to the effects of chlorine. Many victims of chlorinated water report that they were suffocated by toxic gases surrounding the swimming pool. Poor maintenance and inadequate ventilation system worsen the situation. The case is more severe for people with asthma.
2) Neurological Dysfunction Chemically sanitized water that uses chlorine is dangerous for the nervous system as well. Numerous cases have been reported that corroborate this fact. According a research conducted by the Center for Disease Prevention and Control (CDC), 16% of total chlorinated-water cases are attributed to neurological dysfunctions.
3) Epiglottitts Chlorine compounds have also been proved responsible for causing epiglottitis in some cases. One such case of severe intensity was reported in Nebraska in 2006 when a sixyear old boy developed the disease from the exposure to toxic gases surrounding an indoor swimming pool. Epiglottitis is the swelling and inflammation of the epiglottis which can disturb normal breathing and can cause medical emergency.
4) Cardiovascular Defects Some people also reported of developing cardiovascular defects that were

directly related to the excessive exposure to chlorine.
5) Skin Infections Chlorinated water is responsible for a causing a high percentage of skin cancers every year. People who are excessively exposed to chemically sanitized water begin to develop rashes and infections on their skins. Chlorine tends to react with organic material to produce toxic substance, which affects the skin.
6) Eye Infection Ocular infection is one of the most common complaints of the victims of chlorinated swimming pools. Subjects feel inflammation in eyes as well as watery eyes. More than one-third of the swimming pool defects are those related to eyes.
7) Gastrointestinal Issues Chlorine also tends to disturb the gastrointestinal system. Many victims of the sanitized swimming pools report that they felt nausea and headaches after bathing. Gastrointestinal problems usually occur when someone swallows the chlorinated water. This produces harmful compounds inside the stomach.
8) Kidney Cancer Although kidney infections are not as prevalent as respiratory and ocular defects, cases that are reported are often severe. Patients are immediately taken to the hospital for treatment as a medical emergency. Prolonged exposure to chlorine-treated water can also result in renal cancer.
9) Liver Infection Liver and kidney infections are almost similar in nature. Both of them result from the swallowing of chemically sanitized water and are comparatively rare to occur. Sodium hypochlorite and similar chlorine compounds (found in most disinfectants) are potential of producing liver cancer in humans.
10) Colorectal Cancer Some victims of chlorinated water developed colorectal cancer as a result of excessive exposure to chlorine.

By-products of trihalomethanes cause uncontrolled in the colon which gives birth to colorectal cancer. What ozone is and how it helps? Ozone is a gas that is that can be very loosely described as a concentrated form of oxygen. It is responsible for the "fresh air smell" that is experienced after a thunderstorm or at the beach or in a room containing a photocopier. Ozone is generated by passing a stream of air through an electric arc (called a corona discharge). It can also be generated by passing air over a specially dosed Ultra-violet lamp. Ozone is not a stable compound and quite rapidly decomposes to oxygen. It has a half-life of only about 20 minutes at room temperature. This means that if one starts with a given concentration of ozone in air, after 20 minutes, that concentration is reduced by half. For this reason, it cannot be manufactured and stored; it must be generated at the location where it is used. Ozone gas, when used to treat water, has very strong biocidal effect: it kills or renders harmless microorganisms that are unaffected by chlorine. This means that in swimming pools ozone is an extremely powerful disinfectant when applied at the correct dose. It is even effective against Cryptosporidium parvum and Giardia lamblia, for example. In addition to its biocidal effect, ozone is an extremely strong oxidising agent. This means that it effectively removes organic pollutants from the swimming pool water. Also, when ozone is used in conjunction with chlorine in a swimming pool, the undesirable chloramines are destroyed and their undesirable effects (see above) are largely eliminated.

To summaries, some of the benefits of using an ozone treatment system in a swimming pool are:

• Protection of bathers against illnesses caused by microorganisms that are unaffected by chlorine.

• Elimination of the eye, nose, skin and respiratory system irritation caused by chloramines in the water.

• Elimination of the unpleasant "swimming pool smell".

• Assist in preserving the fabric of the pool and pool hall by virtually eliminating chloramines.

The Noticeable Benefits Of Using Ozone:

Although the benefits of the **oxidation and disinfection properties** of ozone are of primary importance, its more noticeable benefits to bathers are arguably just as important. Along with its other properties, ozone has the desirable property of acting as a flocculent. This causes it to have an **effect on very fine colloidal particles** suspended in the water. These particles are so fine that they would normally pass straight through the pool filter. **The flocculating effect of the ozone tends to collect the small particles to form larger particles that can easily be removed by the filter**. As a result of this, pool water treated with ozone has highly superior optical properties: it is **clearer, bluer and more sparkling**. That is why for **Olympic and other competition swimming** and diving pools, where water clarity and appearance is extremely important (spectator sports, underwater filming), **ozone treatment is mandatorily selected**. In addition to this, purely anecdotal evidence suggests that water treated with ozone has a **"silkier", "smoother" feel and is kinder to the skin and hair**.
An additional benefit that is nearly always noticed by bathers in pools that have ozone treatment is the **absence of the characteristic and unpleasant "swimming pool odour"** caused by chloramines and found in many chlorine pools. Particularly in pools that have water features (such as wave pools and pools with cascades or rapids), where there is a higher tendency for any chloramines to diffuse into the surrounding air, ozone treatment is used for this reason.
Lastly, bathers and employees in pools that use ozone treatment will notice the **absence of sore eyes, inflamed mucous membranes and skin irritation** caused by chloramines, symptoms that are not uncommon in pools treated with chlorine alone. Hence, it is a recommended practice worldwide to use ozone over chlorine for swimming pools.

And MOST IMPORTANTLY, not only it provides a completely **Infection-free pool** having loads of **commercial savings**, Ozonated Pools make the water **Oxygen-enriched**, whereby its **healthy and safe even if kids consume it while swimming.**

Ozone adds Class.
Switch to Professionalism.
Switch to Team Waterhouse.