

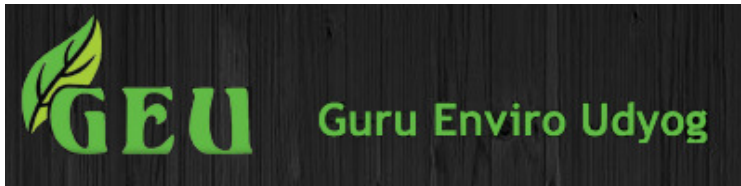
### Safe Swimming Pool:

Swimming pools and recreational water can be dangerous, not only from drowning and other swimming-related accidents but from the quality of the water itself. Let us look at some critical aspects. Number one; usually several persons use a swimming pool thus increasing the chances of contamination multi-fold. Such user-induced contamination can be from users' saliva, sweat, urine, fecal matter, cosmetics etc. Second is the exposure to the environment itself. Swimming pools and water-based recreational parks (theme parks) are open systems. Even a bird flying overhead can cause a huge load of microbiological contamination by just a few grams of its dropping. Third consideration is the water itself can promote bio-growth. Pools with poor circulation are more prone for microbial build-up. Fourth challenge is that the water is re-circulated, increasing the possibility of microbiological build-up. It is not practical to keep infusing fresh water into the system.

Besides the microbiological quality, some physico-chemical parameters are important to ensure user comfort and maintenance of the piping, equipment and optimum performance of the agents added. Such parameters are pH, alkalinity, TDS and hardness of water. Though both chemical and microbiological parameters are critical, we shall now examine the microbiological parameters in detail. A poor microbiological quality can pose many acute health conditions such as diarrhea, dysentery, middle ear infections, skin infections etc.

Historically chlorine has been the mainstay to check and control microbiological contamination in swimming pools. There are many reasons; most important being that it is very effective. Chlorine also has good residual action and easy to administer, being available in several forms. The 'contact time', meaning the time it takes to be in contact with the water for it to effectively reduce the microbiological load, is at least 4-hours. But the spectrum of its antimicrobial activity is wide covering all the problem pathogens. Whilst pool water disinfection with chlorine is good, the flip-side is that it generates a host of harmful by products. One should understand the consequences of disinfection. When disinfecting, the disinfecting agent reacts with the microbes and other organic material abundantly present in the pool water. While destroying the microbes, the disinfecting agent, namely chlorine also generates by products. These are referred to 'Disinfection By Products'. Though chlorine is very effective, the challenge is to make it safe in terms of its Disinfection By Products - DBPs. Chlorine generates DBPs such as tri halo methanes (THMs) and halo acetic acids (HAAs). These chemical entities are harmful and are carcinogenic. Please click on the following link for more information on the subject: [http://www.epa.gov/envirofw/html/icr/gloss\\_dbp.html](http://www.epa.gov/envirofw/html/icr/gloss_dbp.html) (parameters to be monitored and kept under check)

While discussing the ill-effects of chlorine use, it will be relevant to examine ways and means to handle the health hazard inevitable with chlorine use. THMs and HAAs are essentially organic compounds that can be oxidized and made harmless. The trick is to find an agent that can firstly oxidize the THMs & HAAs. Secondly, if such an agent can also treat the pool water, it will be a bonus. Ozone fits the bill perfectly. Ozone can oxidize the THMs and HAAs. It is also a proven agent to treat pool and recreational waters. Ozone, by itself, does not generate



any harmful DBPs. For more information on ozone, please see the accompanying article titled: [Ozone and its relevance today](#)

The focus of this article is to understand the utility and safety of ozone as a pool treatment agent and how chlorine will be an adjunct. Chlorine finds use along with ozone in treating swimming pools because ozone dissipates into innocuous oxygen very quickly. It cannot give a lasting residual action. But the chlorine requirement in a swimming pool will be reduced to less than 50%. Ozone's spectrum of action covers all bacteria, viruses and protozoa. Most important, it can remove the harmful DBPs generated by chlorine. With ozone, remarkable water clarity can be achieved. This is because the dissolved organic material in the water cause a cloudy appearance. By reducing or removing the dissolved organics that cause a cloudy appearance, the water gets extremely clear. In a properly ozonated pool, we can see a coin at the bottom of the pool in the deep-end. The pool water will be devoid of the usual chlorine odour. In fact the chlorine smell in pool water is due to the chloramine generated by the action of chlorine. Chloramine can compromise the swimmer comfort considerably. Chloramine is usually removed by 'superchlorination'. For details on 'superchlorination' please see accompanying article titled: [Pool Tips](#)

Ozone being a highly unstable gas, it has to be generated as and when required at site. Ozone does not dissolve in water easily. The ozone absorption equipment has to be specially designed considering various factors

Ozone offers unbelievable operational savings. Substantial savings on chlorine consumption is possible - it will be down to about 50% of its usual requirement. It will not be necessary to frequently bleed and replenish the pool water - scope for considerable savings. Operational ease since the piping and other equipment will be relatively free of clogging etc - excellent efficiency of the treatment plant

Most important, a safe pool free of harmful byproducts and a comfortable pool, is possible only when ozone is a part of the pool treatment system