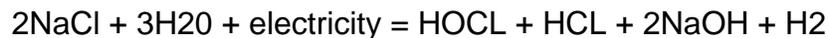


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Pool Tip #48: Chlorine Generators

There is a great deal of misunderstanding surrounding the use of so-called “salt systems” or “salt generators” in the pool industry. Electrolytic cells, or more properly called “chlorine generators”, change non iodized salt or low calcium and magnesium salt – salt pellets like those used in water softeners or for making home-made ice cream, into chlorine gas. Electricity is applied to salt dissolved in water to form hypochlorous acid (the active sanitizing ingredient in chlorine), sodium hypochlorite (liquid chlorine made from chlorine gas and sodium hydroxide), and hydrogen gas.



I cannot stress this point enough: chlorine is chlorine whether you buy it or make it on site. There is absolutely nothing different about the chlorine you generate on site at your pool, other than its freshness. You are not sanitizing and oxidizing the water with salt. You are using salt and electricity to make chlorine.

Chlorine can be generated on-site at the pool using either in-line or off-line methods. One pound of chlorine can be produced from approximately 1.67 pounds of salt.

In-Line Generators

In this method, 200 - 500 pounds of salt is added directly to the pool for each ten thousand gallons of water. Pool water is circulated through an electrolytic cell consisting of electrically charged, layered plates. Chlorine gas is produced, as are sodium hydroxide and hydrogen gas. All three products are drawn into the circulation system by venturi, mix with pool water in the return line, and are then introduced into the pool through the return inlets. Excess chlorine generated using this method reverts back to salt in the water to be reused.

Off-Line Generators

There are two common types of off-line chlorine generators, the traditional diaphragm or brine systems, and the MIOX system.

In the traditional brine system, there are two chambers separated by a diaphragm membrane. Electricity is passed through a salt water anode (positive

electrode) chamber to a distilled water (negative electrode) cathode chamber . The brine solution is split, the chlorine is freed from the salt and bubbles to the top of the chamber. Current carries the sodium ions through the membrane to the cathode chamber, where they react with distilled water to form sodium hydroxide and hydrogen. The hydrogen gas is vented off into the air, and the chlorine compound is introduced into the pool.

The MIOX system is a variation on off-line chlorine generators. Just like the other methods, salt, water and electricity are used to create sodium hypochlorite (and the manufacturer claims, other chlorine-oxygen species). Chlorine is generated on site from a sodium chloride saltwater brine solution by passing the brine solution through a electrolytic cell. The chlorine and mixed oxidant solution is collected in a bulk storage tank and injected into pool water as needed using a peristaltic or diaphragm pump (chlorinator).

Advantages and Disadvantages

The main advantages of using any method of on-site chlorine generation include knowing that the chlorine compound you are using is full strength, fresh and without contaminants. Additionally, you eliminate the hazards associated with storing and transporting chlorine or chlorine compounds. With the in-line and traditional off-line methods, water treatment costs are low. The manufacturer of MIOX systems (but not independent researchers) also claims: better inactivation of *Cryptosporidium* than chlorine at same doses, more stable and longer lasting chlorine residual with 1.4 times more oxidizing power than chlorine, that the product does not react to form chloramines so there is a lower THM formation, and that MIOX oxidizes ammonia at doses below breakpoint levels resulting in less need to superchlorinate.

Note: Contrary to manufacturer's claims, with all methods of chlorine generation in a warm water, heavily used pool, there will be a rise in combined chlorine. There is no such things as a "good chloramine", just less objectionable forms. Nuisance residuals in poorly ventilated indoor pools is a concern. Monochloramine reacts with FAC and forms di chloramines and tri chloramines (nitrogen trichloride).

The primary disadvantages of using the in-line method include the fact that the pool water has a slightly salty taste, total dissolved solid (TDS) levels build rapidly, and some pieces of pool circulation and filtration equipment and their components will deteriorate more rapidly. With all the methods, the chlorine generating equipment must be cleaned and maintained regularly to prevent fouling. The equipment used to generate the chlorine is somewhat costly and does take up additional space in the chemical storage room. The systems are complicated and more monitoring of the process and staff training will be required. You will still need to store a back-up sanitizer on the premises since chlorine generation systems cannot always keep up with demand, and for vomit, dead animals or fecal accident emergency clean-up procedures. And with the MIOX system, you may need to soften the water.

My recommendation: Stick with the sodium hypochlorite or calcium chlorine hypochlorite chlorine compound you are already using. Buy fresh chemicals from a reputable distributor. And spend your money on a UV light or ozone secondary water treatment system.