

# Beyond Chlorine

By Erin Peterson

If he sounds like a salesman, it's because he is. With the glowing reverence usually reserved for deities or highly paid sports stars, Timothy Petsch of TMI Salt Pure Corporation details the benefits of on-site chlorine generating systems. He boldly claims his system offers **lower costs, less maintenance, better water quality and fewer harsh chemicals**. But when asked if the systems have taken the country by storm, he falters for a moment. "It's a hard time gaining acceptance in the commercial sector" he admits.

It's a common lament. While bromine, ozone chlorine generating systems and combinations thereof have been touted by manufacturers as revolutionary alternatives to conventional gas, liquid and solid chlorine, none has made a substantial impact on the commercial market. It's not the direction most imagined the industry was headed just a few years ago.

A change in national fire codes about 10 years ago created strict guidelines regarding the handling and usage of hazardous materials such as gas chlorine. While these guidelines didn't outlaw gas chlorine outright, they hamstrung many pool operators who, for liability reasons, would no longer use it in their pools. After decades as the dominant sanitizer, gas chlorine suffered an exponential decline in use over the next few years as operators phased it out of their pools. This process left the door open for new sanitizing methods to capture the market. As it has turned out, pool operators have not strayed too far, preferring variations of chlorine over systems incorporating bromine and ozone. Kent Williams, a consultant who works with the Professional Pool Operators of America, estimates that close to 90 percent of all institutional pool operators still buy some form of chlorine for their pools.

Nonetheless, manufacturers of alternative sanitizers remain optimistic that the right product will eventually lure operators from chlorine's grasp. Ralph Vatalero, president of the sales company Aquatic Environmental Systems Inc. in Scottsdale, Ariz., says customers are open to possibilities. "Pool operators are always looking for that one alternative that provides the best solution," he says.

As yet, there is no universal "best solution." Constrained by government regulations and the desires of pool operators, companies face daunting challenges trying to introduce sanitizing solutions. Operators demand a safe, effective, low-maintenance and economical product. **The government requires a measurable residual to prove the sanitizer's effectiveness. Currently, only chlorine, bromine and hydrogen peroxide comply with this regulation;** all pool sanitizers must include at least one of these chemicals in its mix. In general, manufacturers have responded to these intersecting demands by tinkering with current system sizes and making small alterations in the composition of their products, rather than making sweeping changes.

The most recent system to hit the commercial pool market is the chlorine generating system, which processes table salt into chlorine. Although it has been a staple in residential pools from as far back as 1972, only in the past few years has it become available for commercial use. "Most units out there today manufacture a pound of chlorine every 24 hours, so a 200,000 gallon pool would need 15 units," explains Petsch. "It's a plumber's nightmare." However, a recently developed five-pound cell makes such a system a viable alternative for some commercial pools.

**And few could argue with its chemical costs. Far cheaper and more readily available than any pool chemical, salt is an attractive option for owners who don't want to pay a high price for chemicals, or those who might otherwise have a difficult time acquiring chlorine. A salt spill is also far less harmful than a gas chlorine leak.**

Others remain skeptical. The talk about chemical expenses, they say, downplays the true costs of running the system. As Dennis Berkshire, regional manager of Santa Clara, Calif., equipment sales company Knorr Systems explains, "the cost of electricity, the capital cost and the cost of maintenance for that sort of system makes it very difficult for operators to get a positive pay-back for a swimming pool." Vatalero agrees that such a system requires a considerable amount of upkeep because of the parts that would deteriorate in the process of creating chlorine.

Petsch seems exasperated by these arguments. "The only thing that doesn't require maintenance," he says a bit gruffly, "is a plastic Frisbee. Anybody with a little bit of concentration -- maybe two hours -- can fix the unit. Every commercial account of ours has an extra cell and three other components that they can replace themselves." Whatever the case, such a system does offer a unique benefit. Because the salt in the pool acts as a water softener, some users find pools with chlorine generating systems less irritating to their skin. Jeff Miller, an enthusiastic supporter and general manager of Olympic Athletic Club in Seattle, says, "We changed from a bromine sanitation system, and we noticed a dramatic improvement in the quality and feel of the water." Petsch says the system has had particular success in athletic clubs that have aquatic therapy pools targeted toward senior citizens. "As the skin ages, it loses its ability to withstand harsh chemicals," he says, claiming chlorine generating systems to be less likely to cause problems associated with other sanitizers.

Nonetheless, the system has been slow to catch on in the United States. While some have been in place at commercial pools in other countries for years, the systems haven't been installed much in larger pools in the U.S. since they entered this market in the mid-1990s. Says Petsch optimistically, "We're right at the beginning of our penetration in the commercial market in the U.S."

Whether chlorine generating systems will find success or become the next casualty of the pool-sanitizing market has yet to be determined. Still, the fact remains that such a system does not technically offer an "alternative." Chlorine is the chemical that actually sanitizes the pool, even though it's created on site, not bought. For their swimmers' sake, many pool operators disdain the side effects commonly experienced with poorly managed chlorine pools and shy away from chlorine altogether in favor of bromine or a combination of bromine and ozone. Berkshire says that bromine does offer a major advantage over chlorine - it's more user-friendly. "Chlorinated pools experience a buildup of chloramines -- organics in the water -- that have a distinctly foul odor and can cause eye irritation very quickly. In bromine chemistry, it doesn't happen as fast or to the degree of chlorine," he says.

Williams concedes this, but argues that pool operators miss the point if they choose bromine over chlorine for that reason, since chloramines are rarely present in a well-managed pool. "Chloramines gives chlorine a very bad name," he says. "But the bad rep is produced by the chlorine compound that we should be able to avoid anyway." Williams adds that the additional cost of bromine makes such potential benefits less attractive for most operators. Currently, bromine costs twice as much as liquid or solid chlorine, and nearly six times as much as gas chlorine.

To make bromine a more palatable alternative for cash-strapped operators, many manufacturers have tinkered with commercial pool-sized combinations of bromine and ozone. Although ozone does not create a measurable residual in pools, making it an ineffective (not to mention illegal) stand-alone product, chemists have found that adding ozone to a pool helps regenerate up to 70 percent of the bromine ions, which translates into savings on chemical costs. This chemical reaction has made bromine more cost competitive with chlorine systems, although it has yet to perform up to the grand expectations that it shouldered a few years ago. "About five years ago,

the industry was ver hot on bromine; they thought it would be the way things would go,” Berkshire says. “Unfortunately, it hasn’t performed as well as everybody thought it would in the marketplace.” In fact, bromine’s major success has been outside the traditional pool market, in spas and other heated water. Because bromine seems to sanitize more effectively at higher temperatures, operators have favored it in heated therapy pools and other warm-water applications.

Williams thinks he can explain bromine’s somewhat lackluster performance. “Once of the reasons bromine isn’t doing as well is because people have tended to put in an undersized system with too heavy a load. There’s been about a 50 percent failure rate of bromine installations because of it. “ While Williams acknowledges that bromine could work just as effectively as chlorine if sized properly and maintained well, he believes the cost is generally prohibitive. That said, bromine-ozone sanitizing systems have made some inroads in high-profile commercial projects, including the Georgia Tech Aquatic center, the 1996 Olympic aquatic venue. It seems that bromine cannot escape the hulking shadow of chlorine – even literally, because bromine is not especially reactive, it needs a catalyst, which happens to be chlorine. Bromine tablets available in the market are generally composed of about 20 percent chlorine.

If Williams seems to be a curmudgeon, clinging defiantly to chlorine while refusing to accept alternatives, it's not without strong support. The gas chlorine standard, while not without problems, has much in its favor. Because it comes in its elemental form, gas chlorine has no binders and requires no manufacturing processes, as liquid and solid chlorine’s do. And, because it's in its purest form as a gas, it carries no other materials to precipitate into the pool, which can wreak havoc on certain parts of the system and result in increased maintenance costs. At the price of safety, gas chlorine remains the cheapest, most effective sanitizer on the planet. "If all our operators had been certified 10 years ago -- maybe 20 years ago -- we would all still be using gas chlorine, no question," says Williams a bit wistfully. "But since enough mistakes were made by very untrained operators, the gas chlorine industry and the safety officials of the world decided that pool guys couldn't handle it.' Certainly, the safety issue cannot be discounted. A gas chlorine leak has the potential for serious -- even fatal -- consequences.

Less serious, but still a drawback, is the acidity of gas chlorine. Its low pH is a contributor to the mineral stains found in older pools, and pools using gas chlorine require constant monitoring to keep the pool in balance. And like its liquid and solid cousins, gas chlorine will always be associated with its side effects for the user: itchy skin, red eyes and the familiar unpleasant odor. All of these problems, according to Williams, can be solved with the help of a well-trained and watchful pool operator. A vast majority of institutional pools use electronic controllers to help monitor pool sanitizers, which has helped alleviate the majority of these problems.

Liquid chlorine, which has increased in popularity since gas chlorine took a hit, boasts a far better safety record than its counterpart and offers the same effective sanitizer, but pays the price in both cost and side effects.

"Once we left gas, we tripled the cost," says Williams of liquid and solid chlorine’s. Liquid chlorine also increases the weight of the sanitizer. A pound of gas chlorine is roughly equivalent to 10 pounds of liquid chlorine -- about a gallon. While most of that extra weight comes in the form of water, which is harmless enough, it also includes dissolved solids like sodium hydroxide and salt. Though these won't have much of an impact on users, they can clog injectors and fittings.

The extra weight also translates into extra bulk, all of which needs to be stored. Huge storage tanks of hundreds or even thousands of gallons need to be constructed.

The other **drawback of liquid chlorine is its short shelf life**. Though liquid chlorine usually arrives at the pool in about 10 percent solution, a month in storage cause it to deteriorate to about

five percent, which can make it a poor choice for pools that see sporadic use or for operators who like to buy supplies far in advance.

**Solid chlorine** (also known as calcium hypochlorite) in tablet or granular form costs as much or more than liquid chlorine, but has fewer side effects. Like liquid chlorine, it is much safer to handle than gas, especially for untrained operators. But solid chlorine offers other benefits as well. Storage costs for solid chlorine are far lower than for its liquid counterpart, and operators don't have to worry that a few days' wait will make the chlorine less effective. In addition, the composition of solid chlorine gives it a slight edge. "A well-run calcium-hypochlorite pool can give you water quality that's at least as good -- if not better -- than anything else on the market," says Berkshire.

But some of the same problems that plague liquid chlorine are just as prevalent in solid chlorine. **Its tendency to precipitate solids often result in increased maintenance for the system.** On the other hand, it's higher concentration of chlorine means operators can use less, which can result in long-term savings.

**Although chlorine can't claim perfection, it has withstood the test of time, at least in part because pool operators are familiar with its strengths and weaknesses.** Newer systems, no matter how well marketed, will take time and (usually) extensive research and development before having a realistic shot at toppling such a long-time market leader. So far, bromine and ozone have found a niche but have not become the new standard-bearers.

At the present, the triumvirate of gas, liquid, and solid chlorine lead the way, even as alternative sanitizers expand their markets and gain credibility. In the meantime, pool operators have the responsibility of doing their homework. Says Vatalero, "Every sanitizer has its strengths and drawbacks, so each operator, each facility and each organization has to use the one they're most comfortable with. They need to become educated about all the alternatives and choose the one they feel will work best for them."