MAINTAINING THE PERFECT BALANCE

IN UNIVERSITY POOLS

BY ELLEN MEYER

In the simplest terms, over-stabilization occurs when too much cyanuric acid is added to pool water. Over stabilization is a problem because cyanuric acid (CYA) can slow down chlorine's ability to kill pathogens and algae. The active form of chlorine in pools is hypochlorous acid (HOCl), and the concentration of HOCl is affected by both the pH and the CYA concentration.

At low pH, chlorine is in its full active HOCl form. At high pH, chlorine is present as the less-active hypochlorite ion (OCl-). For this reason, pH must be controlled; keeping the pH below 7.8 ensures an adequate HOCl concentration is maintained.

Even with very low (<10 ppm) concentrations of CYA, the concentration of active chlorine (HOCl) is decreased significantly. It is important to control both pH and CYA concentrations to maintain an effective HOCl concentration. Disinfection rates are typically measured in terms of CT values, where C is the concentration of disinfectant and T is the time needed to inactivate the organism. When increasing CYA concentrations, the CT value increases. With more CYA, more time and more disinfectant are needed in order to kill the bacteria.

Pool Shocking

In a 2004 study performed by Lonza, eight identical 6,800-gallon pools were operated for three months at a test facility in Miami, Florida: two control pools with no CYA, two pools at 25-50 ppm CYA, two pools at 100-125 ppm CYA, and two pools at 200-250 ppm CYA. Algae and synthetic bather load were added to the pools once a week. Each week, two days after the contaminant additions, the pools were shocked with 10 ppm available chlorine using calcium hypochlorite (cal hypo). Results showed that increasing CYA concentrations led to increased algae counts. The pools with 25-50 CYA had almost twice as many algae as the pools without CYA, and the 100-125 ppm CYA pools had between 9 and 10 times the algae.

Despite the drawbacks, CYA is a useful tool because it stabilizes chlorine, preventing the chlorine from being degraded by sunlight. The challenge is how to maintain a chlorine residual without compromising its efficacy. To do so, maintenance personnel should use as little CYA as necessary to maintain a chlorine residual and have a way to add un-stabilized chlorine slowly and constantly to the water.

Commercial pools have been using this strategy for years. By adding a small amount of CYA to the pool, the chlorine residual is stabilized. Then, un-stabilized products such as chlorine gas, sodium hypochlorite (liquid bleach), or cal hypo are used to provide a steady source of chlorine. In commercial pools, the chlorine feed is usually performed using feeding equipment and controllers.

The advantage of trichlor is that it is slow dissolving so daily additions of chemicals are not needed, and the equipment needed to feed trichlor to the water (i.e., a floater or tablet feeder) is simple and inexpensive. For every pound of trichlor added, however, about half a pound of cyanuric acid is added to the pool. With the use of trichlor, cyanuric acid concentrations can quickly build up and chlorine efficacy can be compromised. The un-stabilized sanitizers, cal hypo, and liquid bleach work great as sanitizers, but because they are fast dissolving, the equipment needed to feed these products has been more complex and expensive.

The Dangers of Trichlor Tablets in Skimmers

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pool. Although these tablets dissolve very similarly to trichlor tablets, they cannot be used in trichlor feeders. Trichlor and cal hypo are incompatible, and combining them can be extremely dangerous. Putting both of these tablets into a feeder could cause fire, explosion, and the release of toxic gases and result in property damage, injuries or even death.

For commercial pools, the feeders are designed for use with the slow dissolve cal hypo tablets. Many pool professionals are wary of putting chlorine tablets in the skimmer. With trichlor, these worries are well founded. The combination of low pH and high chlorine of trichlor tablets can wreak havoc on pumps and other pool equipment. Cal hypo, on the other hand, has a high pH. Therefore, when it is used, the water moving through the equipment will have high chlorine content, but the chlorine is not as active due to the high pH.

Cal hypo adds calcium to the water. This result can be good for plaster surfaces, but, if left unchecked, too much calcium can lead to scaling and cloudy water. Like CYA from trichlor, calcium must be removed by draining and refilling the water. However, the amount of water needed to correct the calcium addition from cal hypo is much less than the amount of water needed to correct the CYA addition from trichlor. In addition to this advantage, cal hypo helps to protect pool plaster due to its calcium content and high pH.

In summary, if maintenance personnel are keeping the chlorine residual with trichlor or shocking with dichlor, they are not only adding chlorine to the pool, but they are also adding CYA. CYA hinders chlorine efficacy and should be maintained at the lowest concentration needed to maintain a chlorine residual. Slow-dissolve cal hypo tablets are now available that offer the convenience of trichlor, without the CYA. These tablets and the proprietary, slow-dissolving technology in them are long lasting and leave no trace of CYA.

This non-stabilized chemistry helps to avoid over stabilization by giving the pool owner the choices of how much CYA to add and when. With slow-dissolving cal hypo tablets, maintenance personnel no longer need to choose between convenience and efficacy.

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