WHY CHLORINATE SWIMMING POOL WATER?

If asked that question, the vast majority of public pool operators would respond by saying: "for disinfection . . . to kill bacteria and other microorganisms which might infect bathers." That answer is not only incomplete, it is downright misleading. The primary reason for chlorinating pool water is to oxidize (destroy by chemical reactions) organic soil.

A comprehensive analysis of a gallon of water taken from a typical public pool would disclose a vast accumulation of organic and inorganic soil and a comparatively small accumulation of bacteria, mostly non-disease causing species. The analysis would show the presence of dust, algae, clay particles, oils, cosmetics, scale and scrapings from human skin and mucous-like discharges. There would be hair, insect fragments, lint from bathing suits and towels and the myriad forms of soil which cling to the skin surfaces of bathers.

All of the materials on this list would be harmless to bathers, even if swallowed in large quantity. Potentially harmful microorganisms, which might by chance be deposited in pool water, are rare indeed. Yet, because we commonly discuss chlorination in terms of disinfection (destruction of disease causing organisms), we overlook the big job that chlorine must do in a properly operated pool.

Chlorine Burns the Trash, Filter Removes the Ashes

Imagine two pools, each with identical dirt loads as described above. In one, the water contains one ppm of chlorine. In the other, the water contains no chlorine at all.

In the first pool, much of the dirt load would be destroyed by chlorine reaction long before it reached the filter plant. An infinite number of chlorine reactions would reduce the dirt load to a much smaller volume, much as a fire reduces a trash pile to a small volume of ashes. Obviously the filter has a far greater capacity when removing only the ashes of the fire rather than the entire trash pile before it is burned. This is how chlorine cooperates with the filter to make pool water transparent as well as safe.

In the second pool, with no chlorine present, the volume of dirt would continue to increase notwithstanding the fact that it is filtered. Filter cycles would become shorter and shorter. Ultimately the filter would lose out completely, and the water would become unusable.

More Chlorine Needed To Keep the Fire Burning

Less chlorine in the water means less oxidation, less water transparency and shorter filter cycles. More chlorine in the water means more oxidation (a "hotter fire"), greater water transparency and longer filter cycles. That is why one ppm of chlorine is better for swimming pool water than one-half ppm. It also explains in part why super doses of chlorine (as high as six or eight ppm) are often the solution to stubborn water problems and short filter cycles. The experienced pool operator knows that to maintain a truly polished water, he must periodically "burn out" the pool by super-chlorination.

The comparison of chlorine reactions to a fire can be carried a step further to assist in understanding chlorine hydrolysis (reaction of chlorine with water and with substances present in water). In the oxidation process the chlorine is used up and must therefore be replaced if water quality is to be maintained. Further, in an outdoor pool the chlorine will dissipate rapidly from water of any quality through exposure to sunlight. The pool operator who fails to take this into account will have, at best, a peak and valley chlorine residual and the risk of water problems and shortened filter cycles.

The ultimate clarity and polish of pool water is a result of chlorine oxidation, not filtration. The filter is merely an assistant in the process; by removing some of the larger soil particles and the "ashes of the fire" it frees the chlorine residual to deal the final blow that makes the water sparkle to its ultimate.

The Filter Cannot Substitute for Chlorine Oxidation

The swimming pool that is filtered but not chlorinated will quickly develop a dull cast and will eventually become opaque and discolored—a highly objectionable environment for swimming. Conversely, the pool that is chlorinated but not filtered can be kept quite safe, from a public health viewpoint, for a prolonged period of time. Without the assistance of the filter to haul away the ashes, however, the job would ultimately become too great for any amount of chlorine that would be comfortable to the bather.

This discussion of chlorination provides a foundation for exploring some of the more technical aspects of water chemistry such as pH factor, free versus combined residuals and total alkalynity. In the next three issues we will discuss the interrelationship of chlorine oxidation, pH and filtration, short filter cycles, cloudy and unpleasant water, eyeburn, chlorine odor, discoloration and the many other problems which can result from chemical imbalance in swimming pool water.

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