



Chloramine Basics

Wescor has been asked many times for our opinion on chloramine build-up in a pool room and the use of a high volume of outside air to solve the problem. This article is not meant to be a definitive guide to water and air chemistry in a pool room but a primer for those wanting basic knowledge.

Chloramine chemistry

Pool and spa water must be chemically treated, because people using pools and spas contaminate them with organic wastes such as sweat, perfume, urine, and other ammonia-containing compounds. For decades chlorine has been the preferred chemical used to maintain safe water for swimming, because when mixed with water, chlorine forms hypochlorous acid—a potent bactericide.

Hypochlorous acid in its free state is called free chlorine. Free chlorine is very reactive and combines with ammonia in the water to form combined chlorine compounds, also known as chloramines. Compared to free chlorines, chloramines have lost most of their bactericide effectiveness.

People often comment on the chlorine smell in a pool room. What they smell is not chlorine but chloramines—specifically the chloramine by-products ammonia and nitrogen. Besides their unpleasant smell, chloramines are also a main culprit in swimmers' red-eye syndrome and some respiratory ailments.

The amount of chloramines found in the pool is directly correlated to the cleanliness of the swimmers and to how much they sweat in the pool. Requiring swimmers to shower before entering the pool greatly reduces the amount of ammonia and nitrogen in the pool. The warmer the water, the more swimmers sweat and, again, this results in more chloramines and less free chlorines.

Maintaining proper pool chemistry

Maintaining proper pool chemistry depends on reducing the introduction of ammonia and nitrogen by having swimmers shower prior to entering the pool and maintaining the proper amount of chlorine in the pool.

If there is enough free chlorine in the pool, it combines with the chloramines and breaks them down into their basic elements such as water, carbon dioxide, and various salts. When this breakdown occurs, the pool is safe and the pool chemistry is functioning properly, plus the chlorine smell and side effects of the chloramines are significantly reduced.

Shocking the pool to remove chloramines

If the proper amount of chlorine is not maintained, chloramines must be removed by other methods. The traditional method has been to shock the pool with a large amount of chlorine. A less traditional method of shocking uses a non-chlorine reactive agent such as potassium peroxydisulfate.

To shock a pool with chlorine, the pool operator adds three to six times more chlorine than is normally used and raises the level of free chlorines to a high level for four hours before dropping the level down to its normal level. Shocking an indoor pool with chlorine is not recommended, because there will be a concentrated level of chloramines at the pool surface and on the pool deck.

Indoor pools are not (and should not be) designed to have a large amount of air blown across the pool surface. Although this will help during the few hours when the pool is shocked, it chills swimmers and is an energy waster the rest of the time, because the air flowing across the pool surface raises the evaporation rate, thereby increasing energy costs.

The better way to contain chloramines

Better methods than shocking have been developed to contain chloramines if maintaining proper pool chemistry is not possible.

- An automatic chemical feed system should be required for commercial pools. The ideal system is a 24-hour controller that responds to changes in water quality caused by variable swimmer loads.
- Ozone can be also be added to the chlorinated water through an ozone generator which oxidizes the ammonia and nitrogen compounds. In addition, ozone kills all pathogenic bacteria, germs, and viruses it comes in contact with.
- Another method gaining popularity is the use of UV light with chlorine. UV light eliminates chloramines by breaking them down into water, carbon dioxide, and salts.

Using either ozone or UV light can substantially reduce the amount of chlorine necessary to disinfect the pool.

Conclusion

The answer to the chloramine smell in pool rooms is not introducing a high volume of outside air. Using high amounts of outside air to sweep the chloramines off the pool surface is generally not effective; even if it were, all it does is mask the problem of inadequate pool-chemistry maintenance.

Chloramines can be successfully contained by using a 24-hour reactive chemical feed system or using an ozone or UV-light system in combination with a chlorine-feed system. In the rare situation where a well-maintained pool needs to be shocked with chlorine, air quality typically can be restored by extending the ASHRAE occupied-condition outside air requirement during the unoccupied hours for a single over-night or 24-hour period.

Contact Wescor for additional information on pool dehumidification.

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