

Fact Sheet on Cyanuric Acid and Stabilized Chlorine Products

What is cyanuric acid? – Cyanuric acid is marketed as a chlorine stabilizer for swimming pools.

What does cyanuric acid do? – Cyanuric acid forms a weak bond with free chlorine in the pool water, protecting it from the sun's ultraviolet rays to reduce chlorine loss. Properly managed, cyanuric acid has been shown to reduce the amount of chlorine needed to maintain the minimum chlorine residual in an outdoor pool. In a small pool with a moderate bather load, cyanuric acid can significantly reduce the cost for chemical disinfection.

What are dichlor and trichlor? – Dichlor and trichlor, also known as chlorinated isocyanurates, are two solid chlorine compounds that are widely used in public swimming pools. Dichlor and trichlor contain both chlorine and cyanuric acid so it is not necessary to add cyanuric acid to the pool water. Dichlor usually comes in a granular form and is marketed for the residential swimming pool market. Trichlor is often sold in a tablet or stick form for use in an erosion feeder for small commercial pools, such as those at hotels and motels.

What is the downside to cyanuric acid? – By forming temporary bonds with the free chlorine, cyanuric acid will reduce the overall effectiveness of chlorine. The amount of time it takes to kill bacteria lengthens as the concentration of cyanuric acid increases. For this reason, we recommend that all outdoor pools using cyanuric acid as a stabilizer maintain a minimum free chlorine residual of at least 2 parts per million (ppm).

I have an indoor pool. Should I use cyanuric acid? – No. Remember that cyanuric acid is intended to reduce the loss of free chlorine caused by the sun's ultraviolet rays. Indoor pools are not exposed to direct sunlight and therefore, there is no benefit in adding cyanuric acid to the pool water or using products containing cyanuric acid such as trichlor or dichlor.

How much cyanuric acid should be used in a swimming pool? – Chemical suppliers recommend that the optimal range for cyanuric acid is 30-50 ppm, although a study published by the University at California at Davis¹, indicates that there is still significant savings in chemical costs in levels as low as 2 or 3 ppm. Other authorities recommend about 20 ppm for a good cost-to-benefit ratio². At levels above 50 ppm, pools reach the point of diminishing returns where the reduction in chlorine effectiveness and cost of buying cyanuric acid outweighs the benefits. Dichlor by weight contains 57% cyanuric acid. Trichlor contains 54% cyanuric acid.

How much is too much cyanuric acid? – The MN Pool Code Ch. 4717 has set the maximum level at 100 ppm. A 2007 study³ by the Centers for Disease Control and Prevention (CDC) revealed that cyanuric acid significantly diminishes chlorine's ability to inactivate the chlorine-resistant protozoan, cryptosporidium. Based on the findings of the CDC study, we recommend that cyanuric acid levels not exceed 30 ppm.

What are the effects of higher levels of cyanuric acid? – As the level of cyanuric acid rises, free chlorine's ability to act as a disinfectant is weakened. At above 50 ppm of cyanuric acid, the time it takes to kill bacteria in the water is longer compared to swimming pool water without cyanuric acid. Also, as the level of cyanuric acid builds up, the chlorine will become increasingly less effective in keeping the water clean and problems such as increased cloudiness and exceeding combined chlorine limits can occur.

Should cyanuric acid be used in hot tubs or spas? – At even moderate levels of cyanuric acid, the amount of time it takes chlorine to kill *Pseudomonas aeruginosa* (the bacteria that causes “hot tub itch”) can be as much as a hundred times as long as in a hot tub or spa without cyanuric acid. For this reason, we do not recommend the use of cyanuric acid or stabilized chlorine in hot tubs or spas.

How does one test for cyanuric acid? – Any pool operator who uses cyanuric acid or stabilized chlorine should purchase a test kit capable of measuring cyanuric acid and understand how to use it properly. The best way to manage the problems that come with too much cyanuric acid is to avoid them. Cyanuric acid level should be tested at least once a week.

My pool has cyanuric acid levels above 30 ppm. How can I reduce them? – Unlike chlorine, cyanuric acid is never used up and accumulates in the pool water as a waste product. Once you have added it to the pool water, it will remain in the water. The best way to reduce cyanuric acid is to partially drain the pool and add fresh water. Note that some cyanuric acid will cling to the pool tub, plumbing and filtration system, so even after completely draining and refilling the pool, there will probably be detectable to moderate levels of cyanuric acid in the newly added water.

Summary of Recommendations

1. Cyanuric acid and stabilized chlorine (dichlor or trichlor) should be used in outdoor swimming pools only. It should never be used in indoor swimming pools, spas or hot tubs.
2. Both dichlor and trichlor release cyanuric acid to the pool water. It is not necessary to put additional cyanuric acid into a pool that uses dichlor or trichlor.
3. Pools that use cyanuric acid should maintain a free chlorine residual of 2 ppm.
4. Cyanuric acid should be tested at least once a week to keep concentrations below 30 ppm.
5. Cyanuric acid levels should never exceed 100 ppm.
6. Partially drain pool and add water to reduce cyanuric acid concentration.

References

- 1- Williams, Kent. “Cyanurics – Benefit or bomb?”. Professional Pool Operators of America. Newcastle, California 1997.
- 2- Williams, Kent. Aquatic Facility Operator Manual, 3rd edition. National Recreation and Park Society 1999.
- 3- Shields, JM; Arrowwood, MJ; Hill, VR and Beach, MJ. (2007) “Inactivation of *Cryptosporidium parvum* under chlorinated recreational water conditions. Journal of Water and Health. In press.