

CRYSTAL CLEAR POOLS

Pools, Spas, and Accessories!

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Water Chemistry 101 Guide

Proper water chemistry is required to keep a swimming pool safe and clean for swimmers, and maintaining a swimming pool's chemicals can save pool owners time and money. By following these steps, any pool owner can maintain their own swimming pool.

Determine what type of chlorine you should use. Chlorine, which kills bacteria, algae, and microorganisms, is available in bottles, 3-inch tablets, 1-inch tablets, sticks, and a granular form; however, upon inspecting the labels, you will see that the active ingredient is similar in all of them. Despite the wide range of prices, the only real difference you may find is the concentration of the active ingredients. ***Please compare.***

The active ingredient in 3-inch tablets, 1-inch tablets, and sticks is called "Trichlor" (or Trichloro-S-Triazinetrione), and the active ingredient in granular chlorine is called "Dichlor" (or Sodium Dichloro-S-Triazinetrione).

The most common (and therefore the least expensive) form of chlorine is 3-inch tablets, which are slow-dissolving and require less maintenance.

Chlorine sticks are larger and dissolve even slower than 3-inch tablets but are not as popular.

1-inch chlorine tablets dissolve more quickly than 3-inch tablets or chlorine sticks and are better suited to above-ground swimming pools, small in-ground swimming pools, and spas.

Look for a concentration of **90% Trichloro-S-Triazinetrione** in chlorine tablets or sticks.

**Note that cheap, "big box" slow tabs and sticks tends to have binders and fillers that keep the tablet together. You will notice the difference as they dissolve: cheap tabs and sticks tend to crumble or fall apart within 2 to 3 days as opposed to gradually dissolving and maintaining their shape.*

Granular chlorine works just as well as the tablets and sticks mentioned above; however, inorganic chlorine such as calcium hypochlorite must be pre-dissolved in a bucket of water before adding to a swimming pool. It must also be added to the swimming pool almost every day. Other types of organic chlorine (Sodium Dichloro) or inorganic Lithium Hypochlorite do not need pre-dissolving. These allow very precise control over the chlorine level of the swimming pool but require daily testing and addition of the chemical.

Look for a concentration of **56% to 62% Sodium Dichloro-S-Triazinetrione** in granular chlorine.

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Use Cyanuric Acid to help maintain chlorine levels and lessing chlorine loss. Use cyanuric acid with caution. Cyanuric acid (CYA, also called isocyanuric acid) is found in dichlor / trichlor tablets. Although cyanuric acid it is a stabilizing ingredient in chlorine that prevents it from being destroyed by the sun, it does so at the cost of reducing the effectiveness (ORP, or oxidation reduction potential) of the chlorine. If you do use cyanuric acid, be sure to test the levels. If the levels are too high, the chlorine will completely lose its sanitizing ability.

Certain new studies are showing that CYA really needs to be maintained at a level no higher than 40 ppm allowing chlorine to perform optimally (high levels of CYA contribute to TDS or Total Dissolved Solids which "interfere" with chlorine activity).

If you choose to avoid cyanuric acid, look for calcium hypochlorite (solid) or sodium hypochlorite (liquid). You should also make an extra effort to test your pH; these two chemicals contain strong bases and will raise pH if used in sufficient quantity.

Add the chlorine to your swimming pool. Floating chlorine feeders and automatic chemical feeders, available from any pool supply distributor, slowly dissolve 1- and 3-inch chlorine tablets or chlorine sticks into your pool water. Automatic chlorine feeders are a great help to properly maintaining your swimming pool. Chemical feeders slowly meter out precise amounts of chlorine into your pool water automatically, and offer very precise control over the amount of chlorine being added to the swimming pool. If a feeder is adjusted properly, you may not have to worry about your chlorine level for a week or more.

You should never simply dump chlorine tablets or sticks into your swimming pool or place them in the skimmer basket of your swimming pool (though there are certain brands made that only dissolve when water is flowing over them). If a chlorine tablet is dissolving in your skimmer basket, all of the water passing through your pool plumbing and circulation system will carry a high level of chlorine. This high concentration of chlorine (which gives the water a very low pH) slowly eats at the inside of the circulation system and can cause premature failure of your pool pump and filter components.

Shock the pool weekly. As it works to clean your pool, chlorine binds to other chemicals like ammonia and nitrogen, which not only render it effectively inactive, but also create an irritant that can cause skin conditions like jock itch. To eliminate combined chlorine, apply an occasional dose of shock treatment. Follow up the next morning with a maintenance dose of algaecide. Algaecides are surfactants that work on pool surfaces to prevent algae from growing.

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Maintain a proper Alkalinity and pH levels. This is just as important as having chlorine in the pool. Alkalinity should be maintained between 80ppm to 120ppm and the pH level in your pool should be about the same as the pH level of human tears, 7.5, though in the range of 7.2 - 7.6 is optimal. Chlorine is about 10 times more effective at sanitizing your water when the Alkalinity is 80ppm to 120ppm and pH is at 7.2 – 7.6 rather than at a high pH level of say 8.2.

Why is this? Because Chlorine is only 10% effective in high Alkalinity and pH. Therefore water clouds, algae growth accelerates and scale forms. pH can best be measured with a reagent or drop-type test kit or test strips. Surfactants that work on pool surfaces to prevent algae from growing.

Most often you'll find the pH level is high; the best way to lower pH is by slowly pouring "Muriatic Acid" (AKA Hydrochloric acid) directly into the deep end of the pool while the pool pump is on and the water is circulating. ***USE CAUTION WHEN HANDLING MURIATIC ACID, PROPER EYE PROTECTION AND SKIN COVERAGE IS REQUIRED. IF THE LIQUID GETS ON YOUR SKIN OR CLOTHING RINSE IMMEDIATELY WITH WATER.*** However, granular acid (pH Minus or Decreaser) is safer to use alternative than Muriatic Acid.

When adjusting pH, add smaller amounts then retest after about 4 to 6 hours of continuous filtration to gradually make changes. Readjust as needed. This will prevent "bouncing". If you have a true pH bounce problem, that is typically due to a LOW Total Alkalinity issue; once properly adjusted, the pH should maintain itself well over a period of 1 to 4 weeks depending on rain, use, etc.

If swimmers are having a problem with "burning eyes," high or low pH is probably to blame, not high chlorine.

Test the water at least two times per week to ensure balance. Maintain your pool chlorine (FAC or free available chlorine - the good kind) level at 1-3 ppm at all times and you are guaranteed an easy and low-maintenance swimming season!

If chloramines or combined chlorine is allowed to accumulate, it will become more difficult to break-up or control, leading to "smelly" water, cloudy water, irritated eyes and skin, early algae growth, etc. and becomes a chlorine demand. When a chlorine demand is present, it will be difficult to maintain a secure chlorine level and requires a HUGE amount of chlorine to satisfy the demand (amounts of 50 or more pounds in 20,000 gallons of pool water is not uncommon). If the chlorine demand is NOT satisfied, the problem will only worsen as more chlorine is combined to form more and more chloramines. Special Note: much of the public (potable) water is currently treated using chloramines (chloraminization), thereby adding to the problem.

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Professional testing should be done 3 to 5 times each season; professional testing will and should perform further tests usually not available to consumers: total chlorine versus free chlorine, cyanuric acid, acid demand, alkali demand, adjusted total alkalinity, calcium hardness, water temperature (makes a difference in overall water balance), total dissolved solids (TDS), iron, copper, QAC (quaternary ammonium compounds), or algicide level.

Adding borate at a concentration of 50ppm to pool or spa water acts as a secondary pH buffer to minimize pH fluctuations but also makes the water take on a soft and silky texture.

To prevent scaling or acidic conditions then follow the langlier saturation index to determine the overall balance of your water.

The difference between chlorine and bromine - Chlorine combines with bacteria or harmful organics to kill them, most of the chlorine is used up and will no longer work to sanitize your swimming pool. This “combined chlorine” will be burned off by the next shock treatment and removed from the pool water by the filter. When bromine combines with bacteria in pool water, the bromine is still active but combined with the bacteria and organic matter to neutralize these harmful contaminants. When you shock a bromine pool, the shock treatment only burns off the harmful contaminants, leaving a good portion of the bromine behind in the pool water. The bromine left behind is available to sanitize the pool again. The result is that the volume of bromine tablets needed to sanitize a swimming pool is noticeably less than the volume of chlorine needed to do the same job.

There are definite advantages and disadvantages to using bromine. Bromine is considered better by some pool owners because bromine is usually much less irritating to the skin and eyes. Many pool owners with naturally sensitive skin prefer bromine; however bromine is in the same periodic group as chlorine, so it may not help people who are allergic to chlorine. The disadvantage to bromine is that the chemical costs a good deal more per pound than chlorine. Because it's so stable, moreover, it can also be harder to wash its smell from your skin or swimwear. Overall, bromine isn't a great alternative to chlorine for a full size pool, so consider using it for smaller facilities such as hot tubs or Jacuzzis. Bromine is available in tablet form and can be added to pool water using a chemical feeder to dissolve the tablets.

Special note: bromine CANNOT be stabilized with cyanuric acid - don't even try.

Another chlorine alternative is baquacil, wherein the active ingredient is biguanide. Though it's less user-friendly and more expensive, it may be the best alternative for anyone who is chlorine-intolerant because even salt water pool systems produce chlorine. If you use baquacil brand sanitizers,

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you can still use any brand for the calcium or ph balance.

Special note: *baquacil CANNOT be stabilized with cyanuric acid. Don't even try!*

Salt chlorinators are another pool sanitation method. A low level of salt is added to the pool and is then converted to chlorine in the pool's control box, thereby maintaining the sanitizing of the pool. Just be sure to watch your pH level, as the chemical reaction that takes place here raises the pH level and will need to be lowered with "Muratic Acid".

Improper installation of salt/chlorine generators can lead to other pool problems such as etching of pool surfaces, premature corrosion of metal pool parts and accessories even stainless steel, etc.

Do not attempt to convert a bromine pool to chlorine, even salt-chlorine. It is not possible. The chlorine generated will simply regenerate the bromine.

If you have questions you can call us during normal business hours.

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