

Water Chemistry



We get a lot of Ask the Pool Guy questions about what the proper water chemistry levels are for a swimming pool.

Fresh Clear Pretty Water Still Needs to Be Balanced!

*If you start with fresh water, just because the water looks clear doesn't mean it is balanced. If you have an acid wash performed, a vinyl liner replacement, or have refilled your pool for any reason you **MUST BALANCE** your water.

Ask the Pool Guy's Water Testing

We recommend testing your water 1x/week with test strips for a test kit, and bring a water sample to your local pool store 1x/month during the summer for comprehensive water testing.

The Ask the Pool Guy team can perform water balancing, just request a service call to your home.

Swimming pools with water chemistry issues will result in wrinkled liners, rusting stainless steel screws in the skimmer, return fittings, and lights, and etching or staining and deposits in the surface of gunite/pebble/marcite pools, as well as deterioration of your metals in your pool equipment, all of which can be costly to fix, and can be prevented!

Water Chemistry Quick Reference:

- FCL 1.0-3.0 ppm

- pH 7.2-7.6
- TA or ALK 80-120
- CH 200-350 Gunite Pools or 150-200 Vinyl Pools
- CYA 30-60
- TDS <1500 in non salt pools, the lower the number the better

Water Chemistry Quick Definitions

- **FC – Free Chlorine** – Free chlorine does the hard work of killing bacteria and oxidizing contaminants. Chlorine must be constantly replenished.
- **TC – Total Chlorine** – When the free chlorine combines with contaminants, it becomes combined chlorine, or chloramines. In water, this form of chlorine has very little sanitizing ability, and no oxidizing ability. Total chlorine is just the sum of both combined chlorine and free chlorine.
- **pH – Acidity/Alkalinity** – Needs to be kept in balance to prevent irritation and protect the pool equipment. (7.2 to 7.6)
- **TA – Total Alkalinity** – Appropriate levels help keep the pH in balance. High levels can cause pH to rise. *Always adjust TA before adjusting pH*
- **CH – Calcium Hardness** – Appropriate levels help prevent plaster damage. High levels can cause calcium scaling, low levels plaster etching.
- **CYA – Cyanuric Acid** – Protects chlorine from sunlight and determines the required FC level.
- **Salt** - The salt level should be in line with the salt generator manufacturer directions. Under 4,000 ppm according to the Pentair IntelliChlor Units (3,000-3,500)

A note about: Salt Water Pools - when you are generating chlorine with a salt water system you may find that the pH tends to run high. Liquid chlorine has a pH of approx. 8. To offset this pH you may need to add pH reducer or muriatic acid to the pool. You can also keep the alkalinity on the low end of around 80ppm which should help the pH stay on the lower levels.

Total Hardness: (Total Dissolved Solids)

Total hardness in swimming pools is a measure of all the dissolved minerals such as calcium, magnesium and sodium.

TDS or Total Dissolved Solids is the measure of the total of all the soluble

substances dissolved in the water. It is usually measured by assessing the electrical conductivity of the pool water.

Distilled or pure water has a TDS value of 0 ppm. Drinking water can have a maximum TDS value of 500 ppm according to EPA Water Standards.

For regular fresh water swimming pools, the maximum recommended TDS level is 1,500 ppm. Values above this can lead to problems such as cloudy pool water, staining of the pool surfaces, scaling, hard water and a salty taste. TDS values of up to 4,000 ppm and more have been noted in some well-balanced pool water so the individual levels of total alkalinity, hardness, conditioner, pH and metals should be considered along with the general state of the pool and its chemical demand. The TDS value should be used as an indicator of the volume of soluble particles in the pool relative to that of the fill water used.

In swimming pools using salt-chlorine generators, the large volume of salt added radically increase the TDS level, so any measurements are redundant due to the addition of salt.

If the pool water has become saturated with contaminants and the TDS level confirms this, the pool should ideally be drained and refilled with fresh water. There is no method to reduce TDS effectively without replacing some or all of the swimming pool water.

FC – Free Chlorine

Maintaining an appropriate FC level is the most important part of keeping your water in balance. It is important that you do not allow FC to get too low, or you run the risk of getting algae.

Free chlorine shows the level of disinfecting chlorine available (active plus reserve) to keep your pool sanitary. FC should be tested, and chlorine added daily. If you have an automatic feeder or SWG, you can test it every couple of days. FC is consumed by sunlight, and by breaking down organic material in your pool. The level of FC you need to maintain depends on your CYA level and how much you use the pool.

pH- Acidity/Alkalinity

pH indicates how acidic or basic the water is. pH should be tested daily at first. Once you gain experience with your pool, less frequent monitoring may be appropriate, depending on your pool's typical rate of pH change.

pH levels below 7.2 tend to make eyes sting or burn. PH below 6.8 can cause damage to metal parts, particularly pool heaters with copper heat exchange coils. High pH can lead to calcium scaling.

For lowering pH use either muriatic acid or dry acid. To raise pH use soda ash.

TA – Total Alkalinity

Total alkalinity is a measure of the total alkaline substances found in the pool water. Total alkalinity indicates the water's ability to buffer pH changes. Buffering means you need to use a larger quantity of a chemical to change the pH. At low TA levels, the pH tends to swing around wildly. At high TA levels, the PH tends to drift up. TA should always be adjusted prior to making pH adjustments.

Total Alkalinity, or TA, should usually be kept at 80 – 120 ppm, though in high alkalinity waters this is often hard to achieve without resulting in an abnormally low pH.

Low Total Alkalinity

The results of a low TA may be one or more of the following:

- etching of the plaster, marbelite, marcite or tile grouting;
- corrosion of metal parts (pool heater, steps, scoop pole, . . .);
- staining of the pool's surfaces;
- green water;
- burning eyes and itchy skin;
- pH bounce (rapid fluctuations in pH).

Raising low total alkalinity

Sodium bicarbonate (bicarb) will raise the TA without excessively raising the pH.

Regular pH-up will raise the pH as well as the TA and should not be used. Care should be taken to increase the TA over a period of time, adding a maximum of 1 pound of bicarb for each 6,000 gallons of water. The bicarb can be added at this rate every 4 days, until the required level is reached.

High Total Alkalinity

The results of high TA may be one or more of the following:

- pH keeps going up despite regular addition of pH-down;
- cloudy water ;
- burning eyes and itchy skin;
- reduced chlorine efficiency resulting in algae growth.

Lowering high total alkalinity

Regular small “acid shocks” with pH-down will reduce the pH while lowering the TA. This can be an extremely slow process and it may take weeks or longer to reduce high TA. One suggested method is as follows:

- turn off the pumps and allowing the water to settle;
- slowly add the pH-reducer into one spot in the deep end of the pool;
- allow the chemicals to “burn off” some of the alkalinity for 15 – 30 minutes (You may notice some bubbles rising to the surface. This is carbon dioxide and is indicative of the destruction of excess alkalinity.);
- turn the pumps back on and allow the water to mix thoroughly.

The above method should be used only when the pH is high and your pool requires pH-reducer. If the pH is normal, adding a shock will reduce the pH to undesirable levels resulting in further pool problems.

Care should be taken not to let the pH-reducer sit for too long as it will begin etching and softening the plaster, marbelite, marcite or tile grouting. It is also recommended to dilute the pH reducer in a bucket of water before adding to the pool to prevent this problem from occurring.

CH – Calcium Hardness

Calcium hardness indicates the amount of calcium in the water. Over time, water with low calcium levels will tend to dissolve calcium out of plaster, pebble, tile, stone, concrete, and to some extent fiberglass surfaces. You can prevent this from happening by keeping the water saturated with calcium. In a vinyl liner pool there is no need for calcium, though high levels can still cause problems. A plaster pool should have CH levels between 250 and 350. Calcium helps fiberglass pools resist staining and cobalt spotting. If you have a spa you might want to keep CH at at least 100 to 150 to reduce foaming.

You increase CH with calcium chloride. You lower calcium by replacing water or using a calcium hardness reducer which contains chelating agents to bond with the calcium to keep it trapped in solution.

Low calcium hardness results in corrosive water. The plaster surfaces or tile grouting softens and erodes, metal equipment and accessories oxidize and rust quickly, and the water becomes aggressive. This can lead to staining of the pool’s surfaces as well as an eventual need for resurfacing.

High calcium hardness results in scale formation on the pool surfaces as well as scaling in the pipes, plumbing and filter. In extreme cases the water becomes dull and cloudy with the calcium precipitating out into the water rather than onto a surface. High calcium levels will also irritate swimmers, causing sore eyes in particular.

CYA – Cyanuric Acid

Cyanuric acid, often called stabilizer or conditioner, both protects FC from sunlight and lowers the effective strength of the FC (by holding some of the FC in reserve). The higher your CYA level, the more FC you need to use to get the same effect. It is important to know your CYA level so you can figure out what FC level to aim for. If you don’t have a SWG or problems from extremely high amounts of sunlight, CYA is typically kept between 30 and 50. If you have a SWG or very high levels of direct sunlight, CYA is typically kept between 70 and 80.

You increase CYA by adding cyanuric acid, often sold as stabilizer or conditioner. CYA is available as a solid and as a liquid. The liquid costs a lot more, and generally isn’t worth the extra expense. Solid stabilizer can take up to a week to fully register on the test, so don’t retest your CYA level for a week after adding some. Solid stabilizer is best added by placing it in a sock in the skimmer basket. The pump

should be run for 24 hours after adding solid stabilizer and you should avoid backwashing/cleaning the filter for a week.

In nearly all cases the best way to lower CYA is to replace water.

Pool water problems – copper, iron or manganese

Copper, iron or manganese in swimming pool water all cause the water to discolor without affecting the water's clarity much.

If the water changes color after chlorine (or any other oxidizer) is added, the swimming pool water probably contains a metal.

Which metal is in the pool water?

Green pool water – iron or copper

Brown pool water – iron (occasionally copper)

Purple/ black pool water – manganese



Problem Solvers

- **CoverFree** by Natural Chemistry: Liquid Solar Blanket
- **FerriTabs** are an excellent product for removing iron, manganese and trace minerals from the water.
- **StainFree** by Natural Chemistry: Lifts rust stains off steps and white goods in the pool.
- **SeaKlear** to clear up cloudy water or when it just doesn't have that sparkle.

Ask the Pool Guy's Water Balancing Kit:

Must have Chemicals. Keep these on hand throughout your pool season.

- ❑ *Test Strips (for weekly testing at home)*
- ❑ *Chlorine (liquid or powered shock in a packet for a quick acting boost)*

- ❑ *Alkalinity +*
- ❑ *pH +*
- ❑ *pH- or Muratic Acid*
- ❑ *Calcium Hardness Increaser*
- ❑ *Algaecide*
- ❑ *SeaKlear*
- ❑ *Well Water Users: FerriTabs*
- ❑ *Salt System Users: 2-3 bags of salt or Chlorine Users 1" Tablets*

Ask the Pool Guy's Water Service

Call for pricing.

Includes:

- Complete Package listed above plus a Free Sample of one of the Problem Solvers.
- Delivered direct to your door.
- Free Water Chemistry Lesson.
- Free On-Site Water Test.
- Balancing step-by-step instruction.

