

# A Comprehensive Chemical Guide to Maintaining Clear Pool Water



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# Introduction

The trick to maintaining crystal clear pool water lies in how well you keep the water chemically balanced. Because most pool owners are not professional chemists, certain pool water issues may arise, and we want you to be a knowledgeable pool owner.

In this eBook, we are going to go over the ABCs of basic pool water chemistry, as well as provide tips on how you can troubleshoot and solve some of the most common pool water issues pool owners face.



## A Quick Pool Chemistry Guide for Ideal Water Results

To maintain a safe and healthy swimming pool, there is a standard range your pool chemicals should always fall within. The graph below provides a quick snapshot on what your water results should look like every time you test it with a standard water testing kit.

Free Chlorine	1.0 to 3.0 ppm
PH	7.2 to 7.8 ppm
Total Alkalinity	80 to 120 ppm
Calcium Hardness	200 to 400 ppm
Cyanuric Acid	30 to 50 ppm (Indoor pools should be 0 ppm)
Combined Chlorine	0
Salt	2700 to 3400 ppm (May vary by unit)
Borate	30 to 50 ppm
Metals	0 ppm
Saturation Index (LSI)	-0.3 to +0.3 (0 is optimal)
Bromine (if applicable)	3 to 5 ppm

Testing kits are available in 3-way and 6-way test kits. Your 3-way test kit typically measures chlorine, pH and bromine levels, while your 6-way test kits measure free chlorine, bromine, total chlorine, pH, alkalinity, total hardness and cyanuric acid.

# Going Back to the Basics

When you test your pool water, you should be regularly testing for these five chemicals:

- Free Chlorine (FC)
- pH
- Total Alkalinity (TA)
- Calcium Hardness (CH)
- Cyanuric Acid (CYA)

## **Free Chlorine**

Your pool's chlorine must be constantly replenished in order for your pool water to remain clean, safe and balanced. When testing for free chlorine, the levels shown reflect the amount of disinfecting chlorine available to keep algae and other wastes at bay.

Your free chlorine is constantly being broken down by the sun's UV rays and organic materials in your pool. If your pool is being used often, it's important to test your free chlorine levels at least twice a day and replenish the chlorine as necessary.



The amount of chlorine your pool needs depends on three factors:

- a) How often you are using your pool
- b) What type of chlorine you are using (i.e. whether or not you have a salt water generator)
- c) Your cyanuric acid levels

If you are not using a salt water generator, you can find chlorine as granules, tabs, and pucks. Sanitizers are also available as both stabilized and unstabilized options. The benefit to using the stabilized sanitizer is that it also contains cyanuric acid.

### **Cyanuric Acid**

Often called a stabilizer or conditioner, cyanuric acid protects free chlorine from sunlight and reduces its effective strength. By reducing the effective strength of the free chlorine, it can be held in reserve so that it lasts for a longer period of time.

The higher your cyanuric acid levels, the more free chlorine you will need to use to keep your pool water crystal clear.

- If you *do not* have a salt water chlorination system, your cyanuric acid levels should be between 30 ppm and 50 ppm
- If you *do* have a salt water chlorination system, your cyanuric acid levels should be between 70 ppm and 80 ppm

Cyanuric acid comes in both liquid and solid form with most pool owners finding greater value in the solid form. Solid stabilizers can take up to one week to fully register on your test, so do not retest your cyanuric acid levels for a week after it has been added. Make sure that the pump runs for a full 24 hours after it has been added.

## pH

The pH of your pool indicates how basic (alkaline) or acidic your pool water is. This is a measurement that should be taken daily prior to slipping into the pool.

The ideal pH for most pools is between 7.7 ppm and 7.8 ppm, although anything that is between 7.2 ppm and 8.0 ppm is acceptable for swimming.

If your pH slips below 7.2 ppm, you may be experiencing a stinging or burning sensation in your eyes. If the pH continues to plummet to 6.8 ppm or lower, your pool water will begin to corrode the metal parts of your pool (particularly the copper coils of your pool heater).



### **Total Alkalinity**

Your pool's total alkalinity is an indication of how well your pool water can manage changes in your pH. If your total alkalinity is low, you may notice your pH quickly bouncing between high and low ranges. If the total alkalinity is high, your pH tends to increase.

Pool owners can raise their total alkalinity with baking soda, though be sure to do so in two or more steps to make sure your pH stays within an appropriate range. To lower your total alkalinity, acid can be added to reduce your pool's pH to 7.0 and 7.2, and then aerate the pool until the pH reaches 7.6 ppm.

### **Calcium Hardness**

Calcium hardness is an indication of how much calcium is in your water. If your pool water has low calcium levels, it will start to dissolve the calcium out of pebble, tile, plaster, stone, concrete and even fiberglass surfaces.

Vinyl liner pools do not need calcium (even though high levels can still cause issues). Plaster pools without a salt water generator should have a calcium hardness between 250 ppm and 350 ppm, while those with a salt water generator should have a calcium hardness within the 350 ppm to 450 ppm range. If you have a spa, maintain a calcium hardness level of 100 ppm to 150 ppm (this reduces the amount of foam the spa produces).

Calcium hardness can be increased in two ways – with calcium chloride or calcium chloride dihydrate. You can decrease calcium by replacing some of your pool water or using a reverse osmosis water treatment.



## Other Chemicals Levels You May Want to Test

In addition to testing free chlorine, cyanuric acid, pH, total alkalinity and calcium hardness levels on a regular basis, you may consider adding combined chlorine, salt and borate levels depending on your pool.

So why should you consider adding these three tests to your regular pool maintenance schedule?

- **Combined Chlorine:** Your combined chlorine tells you that there is something in the water that your free chlorine is trying to break down. In a typical outdoor pool, as long as the free chlorine levels are kept at optimal levels, your combined chlorine should be near or around 0. If it is above 0.5, however, you will need to shock your pool water to sanitize it and keep it crystal clear.
- **Salt:** If you have a salt water chlorine generator, check the manual for your unit and see how much salt should be in the water. Most models will recommend keeping that level around 3,000 ppm.
- **Borate:** This optional water enhancer helps control your pH and keeps algae at bay, and it can improve the feel of your water. Your borate level should be between 30 ppm and 50 ppm.

### **What About Phosphate?**

Because your chlorine is already keeping your algae in check, phosphate remover is seldom needed. It is also expensive and a bit cumbersome to use, so it is typically only used in unique situations.



## How Often Should You Test Your Pool Water?

How often you test your pool water depends on a number of factors, including a.) how often the pool is being used; b.) daily weather temperatures; c.) water temperatures. Below is a suggested schedule on how often chemical levels should be tested.

### **Several Times a Week**

If your pool is in regular use, you should check your chlorine levels and pH levels at least two to three times a week. During heavy usage periods, like summer, you may want to test it a couple of times per day.

### **Once a Week**

Test your total alkalinity once a week to help keep your pH levels in check.

### **Once a Month**

Both your calcium hardness and total dissolved solids (the chemical reactions to dust, pollen and other wastes) should be tested once a month to keep scaling at bay and to ensure that your pool chemicals are at maximum efficiency.

### **Once Per Quarter**

It is a good idea to test for copper, iron and manganese every three to four months. If metals are detected, it is important that you detect the source and have them removed to prevent staining.

# Top Pool Problems (and How to Fix Them)

Regardless of how well you have been keeping up with your pool, you may still experience some pool water problems from time to time. Some of the most common pool water issues are listed below with an easy-to-follow solution.

## ***The Green Pool***

Arguably the most common pool water issue, a green pool is the result of an algae infestation. This typically happens when your chlorine levels are too low.

**The Solution?** Shock the pool. It's recommend to use three times the normal amount of shock in order to rid the pool of the algae infestation.

## ***The Foaming Pool***

These pools begin to produce a degree of thin to thick white suds that make your pool appear as if it has hosted a foam party. This is typically caused by using an inferior quality algaecide.

**The Solution?** Use an anti-foam agent. This is an excellent way to remove that annoying foam build up, neutralizing it quickly and safely.



### ***The Murky Pool***

Pools that take on a murky or swamp-ish effect typically have improper pH levels. This can happen because the pH has not been maintained properly, or it can happen after a heavy rainfall, due to the acidity levels in the rain.

**The Solution?** Test your water's pH level and adjust your it accordingly. To lower your pH, you can use muriatic acid or dry acid. Your pH can be raised by using soda ash or borax.

### ***The Oddly Colored Pool***

If your pool water resembles milk chocolate or is a brilliant teal shade, it is likely due to having too many minerals in your pool. Those with excess iron will tend to appear brown, while those with more copper will produce a teal effect. (Beware! It will turn a bather's hair green.)

**The Solution?** There are a variety of chemicals available to help remove the excess minerals in your water.

### ***The Stained Pool***

Pool stains are often organic or the result of having high mineral levels. To test your water, put a touch of pH decreaser into an old sock. Rub the sock on the stain. If it can be removed, make note. If it cannot be removed, repeat the process but with a chlorine stick in the sock rather than the pH decreaser.

**The Solution?** Pool staining is often best handled by a pool professional. The longer the stain is left untreated, the more difficult it will be to remove, which could lead to a more extensive pool repair.

Most common pool water issues can be largely avoided by maintaining proper pool water chemistry and by tackling small issues as soon as they arise. Be sure to contact us for further guidance or assistance if you're unable to solve the problem as minor pool problems can turn into larger ones if left untreated.

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