

What Every Pool Owner Should Know

This guide is intended to help you understand what goes on in a well-tended swimming pool. If you treat your pool water right, your pool will treat you right, by providing endless hours of recreation, entertainment, and relaxation.

This brochure will help explain the basic facts about pool maintenance and chemical storage and handling. It provides information on various types of products and their use to help ensure a safe and happy pool experience for those who use the pool and those who maintain it.

Before you open your first package of pool chemicals, you should know about all the available safety equipment and what might come in handy when treating your pool. Such products include protective equipment for eyes, face, hands, and clothing.

The chemicals needed for your pool help make it clean and more attractive to use. But remember, these water treatment chemicals may present some hazards if not used properly. Before using chemicals, read the labels and directions carefully and follow the manufacturer's instructions. If you have any questions regarding safe handling, storage, or use of a particular chemical, contact the retailer from whom you purchased the chemical or the manufacturer of the chemical. Labels for sanitizers have been approved by the U.S. Environmental Protection Agency (EPA) under the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA). To misuse or to use the sanitizer for other than its intended use is a violation of this act.



If total alkalinity is high (above 120 ppm), it will tend to maintain pH at a higher level than desired and may cause scaling and cloudy water.

Baking soda (sodium bicarbonate) is used to raise total alkalinity. A good rule of thumb is that 1.5 pounds of sodium bicarbonate will raise the alkalinity of 10,000 gallons of water by 10 ppm.

Muriatic acid or sodium bisulfate may be used to lower alkalinity. They should be diluted or dissolved into water and then added into one area of the pool, preferably in the deep end and away from walls and fixtures. The amount of acid required is referred to as "acid demand" and can be measured by some test kits.

Algae Control and Algicides

Algae are minute water-loving plant growths that may be introduced into the pool by wind, rain, or freshly added water. Clean-water algae may be blue-green, green, red, brown, or black in color, and can cause unusual tastes, odors, cloudiness, and slippery spots.

The presence of algae in a pool will increase the sanitizer demand, and therefore, more sanitizer will be required to kill the algae. Algicides are commonly added to prevent and kill algae in the event the chlorine or bromine or biguanide residual is unexpectedly depleted.

Factors Affecting the Longevity of Sanitizers

• **Bathing load.** Your pool will need more sanitizer when the pool is used by large numbers of bathers. Pools should be shocked or oxidized regularly during the swimming season.

• **Sunlight and water temperature.** Sunlight will cause your sanitizer to dissipate more rapidly. The warmer the water, the shorter the life of your sanitizer product; this process is greatly accelerated when water temperature exceeds 85 degrees. The loss of chlorine

caused by sunlight can be minimized by "stabilizing" the pool water with cyanuric acid or by using trichlor or dichlor on a daily basis.

• **Wind and rain.** These elements carry dust, bacteria, algae spores, and other debris into the pool, thus consuming chemical sanitizers. This effect is increased when there are many shrubs and trees near the pool. Pool water should be shocked or oxidized after periods of heavy wind and rain.

Simple Rules for Use, Storage, and Handling of Pool Chemicals

• Establish a routine for testing and treatment. A few minutes every day—or every other day—can make the job easy and help ensure that your pool is in tip-top shape.

• Near the area where you will be using pool chemicals, always keep a list of persons to notify. In case of an emergency, dial 911.

• Keep adequate records about pool operation, chemical purchase dates, costs, amounts used over time, and "on-hand" supplies of the chemicals. The pool owner should periodically review these records to ensure control over how the chemicals are being used.

• Keep the chemicals in the original containers and ensure that the lids are closed tightly when not in use.

• Do not stack different containers on top of one another.

• Keep all chemicals out of the reach of children.

• Store chemicals in a cool, dry place.

• Beware of torn or faded labels. If you don't know exactly what the chemical is, how old it is, or if the label is not legible, don't use the chemical.

• Store pool chemicals away from other chemicals and away from equipment used for garden and lawn maintenance, such as lawn mowers, fuel and lubricants, organic pesticides, solvents, paint, and fertilizers.



• Avoid mixing pool chemicals. Do not mix any combination of pool chemicals either accidentally or intentionally. Use clean scoops—one for each chemical—and avoid combining material from the old to the new containers.

• Never pour water onto pool chemicals.

• Take care of yourself. Do not inhale dust or fumes from any pool chemicals. If necessary, use proper protective devices for breathing, handling, and eye protection. Promptly wash off any residues that get on your skin.

• Don't overdose. Measure the amounts closely. Pool chemicals—like medicine—should be used only in specified amounts. Too much can cause irritating side effects.

• Don't guess. Take time to learn how to use a test kit. And be sure to replace chemicals in your test kit each season to ensure accuracy.

• Apply directly to the pool water. All chemicals should be applied directly to the pool water, either through a suitable feeder, distributed across the surface of the pool, or according to manufacturers' directions. Proper chemical application helps the circulation system produce a uniform distribution of the dissolved chemical throughout the pool in the shortest period of time.

• Dispose of wastes in a safe manner. Sweep up wastes and dispose of wastes properly. Follow local regulations for proper waste disposal. Since these chemicals are intended for use at low levels in water, they usually can be sent through the sewage system with large quantities of water. Do not put floor sweepings of sanitizer chemicals in containers with paper, rags, or other burnable substances. Wash empty sanitizer containers thoroughly and follow local regulations for their proper disposal.

If you have a question regarding the disposal of spilled chemicals, or if a fire starts, immediately call your local fire department. The fire department is equipped to handle such accidents. If fire department personnel are unsure how to handle a chemical spill or fire, they may call the Chemical Transportation Emergency Center (CHEMTREC) at 800-424-9300 (in Canada, 1-613-996-6666).

And last but not least... if you find that taking care of your pool is too much work—or it's a detail you would rather not worry about—check with your builder or local pool service company. They will be able to help make your job easier. Comprehensive contracts are available for semi-weekly inspections, cleaning, and chemical balancing. Other contracts are available for chemical balancing only.

If a pool is not regularly maintained by a service company, an owner should have professional pool care twice each year when the pool is opened for the swimming season and when the pool is closed for winter. When a pool or spa is not being used, it must be properly maintained, covered, or drained.



APSP Meets Your High Standards

When you choose a builder, retailer, or service company for your pool, spa, or hot tub, remember to look for the logo of the Association of Pool and Spa Professionals. It tells you that this company is a member of a national trade association dedicated to high standards. APSP members share a commitment to public health and safety in the installation, maintenance, and operation of pools, spas and hot tubs. They also share a commitment to establish voluntary uniform design and construction standards.

APSP members are leaders in their field and experts in products and related services. They'll help you make the most of your investment in a pool, spa, or hot tub. More detailed information about pool sanitizers and water balance can be obtained by contacting your local APSP pool professional. To receive a list of APSP pool professionals, call 1-800-323-3996.

APSP has many publications that can help you plan, enjoy, maintain, and properly use your pool, spa, or hot tub. Many of these publications are available free of charge. Additionally, a comprehensive booklet on pool safety and use—called "The Sensible Way to Enjoy Your Pool"—can be yours by calling 1-800-323-3996.



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Residential Pool Chemical Guide





A swimming pool is a source of pleasure and relaxation for the entire family. Pools can be private or you can invite a crowd. Pools can be entertaining, educational, romantic, or for exercise.

Protect Your Investment; Protect Yourself

Your pool is a big investment. To protect your investment, you should use your pool safely and operate and maintain it properly.

The first place to start when planning your pool maintenance schedule is to choose one person in your family to be responsible for the purchase, storage, use, and disposal of all pool chemicals.

Types of Sanitizers

From the first day you fill your pool, the water must be maintained with a chemical sanitizer, also called a disinfectant. Enough sanitizer must be present in the water to kill bacteria and algae. Properly maintained pools normally do not have odors or cause eye irritation.

In addition, you must balance your pool water to the recommended pH and alkalinity levels and maintain them in the proper range. For chlorine, bromine, and PHMB sanitizers, maintaining the pool water pH between 7.2 and 7.8 and total alkalinity between 60 and 180 parts per million (ppm) will help ensure your sanitizer is effective.

Chlorine

In the pool industry, the generic word “chlorine” normally refers to any sanitizer that releases free available chlorine—also known as hypochlorous acid—when dissolved in water. Chlorine sanitizers are the most commonly used pool sanitizers. Chlorine is also a strong oxidizer.

• **Cal hypo (Calcium hypochlorite).** This sanitizer is a white solid that quickly dissolves in water to produce free available chlorine. Cal hypo is available as a granular product and in various tablet shapes. Cal hypo has the highest chlorine content of all fast-dissolving chlorine sanitizers.

• **Dichlor (Sodium dichloro-s-triazinetrienes).** This sanitizer is a white granular solid that quickly dissolves in water to produce free available chlorine. Dichlor contains a stabilizer that improves the chlorine stability in pool water that is exposed to sunlight. Dichlor has a minimal effect on pH and total alkalinity.

• **Gaseous chlorine.** This sanitizer is a gas that is stored in high-pressure cylinders. Gaseous chlorine must be administered to pools only by trained technicians in accordance with guidelines from the Chlorine Institute, the EPA, and other applicable codes and regulatory requirements.

• **Sodium hypochlorite (or bleach, sometimes incorrectly called liquid chlorine).** This sanitizer is a lightly colored liquid. Sodium hypochlorite has a relatively low chlorine content when compared to solid chlorine sanitizers.

• **Lithium hypochlorite.** This sanitizer is a white granular solid that rapidly dissolves in water to produce free available chlorine.

• **Trichlor (Trichloro-s-triazinetriene).** This sanitizer is a white solid that slowly dissolves in water to produce free available chlorine. Trichlor is most commonly available in various tablet shapes. Trichlor contains a stabilizer that improves the chlorine stability in pool water that is exposed to sunlight. Trichlor has the highest chlorine content of all solid chlorine sanitizers.

Bromine

In the pool industry, the generic word “bromine” normally refers to any sanitizer that releases free available bromine—also known as hypobromous acid—when dissolved in water. Bromine is also a strong oxidizer.

• **Bromine Tablets.** This sanitizer is a white solid that slowly dissolves in water to produce free available bromine. A chemical feeder is used to conveniently provide a steady addition of bromine to the pool.

Chlorine and bromine can cause a fire if contaminated with combustible organic materials, such as oils, gasoline, and paint thinners. These chemicals can produce toxic gas if contaminated with other materials.

• **PHMB (Polyhexamethylene biguanide).** This sanitizer is an organic polymer liquid solution. PHMB does not release chlorine or bromine when added to water and is not compatible with chlorine and bromine. PHMB is used in conjunction with hydrogen peroxide and an algicide.

Other Supplemental Treatments

• **Ozone.** Ozone is a reactive gaseous oxidizer. An oxidizer is used to destroy organic and inorganic contaminants in water. Ozone kills microorganisms and removes other impurities in the water. Ozone is generated by a device called an ozonator, which disperses ozone into the pool water. The pool plumbing should be designed to minimize ozone exposure to swimmers. A primary sanitizer like bromine, chlorine, or PHMB is required with ozone to ensure that a sanitizer residual is maintained in the pool.

Balancing Your Water's pH

Pool owners need to test the pH level of their pool water. To test for pH, follow the instructions provided in your test kit. If the test shows that the pool water has a pH level that is too low or too high, the water must be adjusted. The ideal pH level for pool water is between 7.2 and 7.8. Remember, a high chlorine residual in the water can affect the pH reading, so take the pH reading before adding any chlorine.

Above 7.8 pH, the pool water is too alkaline. The alkalinity increases as the pH level increases. More sanitizer must then be added to maintain proper sanitation. When the pool water is too alkaline (above 7.8 pH), sanitizing chemicals work more slowly. They may not do their proper job, even though a test of the water may indicate a proper “residual.” A scale may form on or in pool equipment, piping, and the heater coils if the water is too alkaline.

Below 7.2 pH, the pool water is too acidic. The acidity increases as the pH level decreases. If the pool water becomes too acidic (below 7.2 pH), the water can irritate the eyes, corrode metal pool parts and piping, and result in pool interior surface stains. It can also cause leaching of plaster pools.

Common Chemicals that Raise and Lower pH

Muriatic acid and sodium bisulfate are common chemicals that lower pH. Commercial strength muriatic acid, available from most pool suppliers, is about 30 percent hydrochloric acid. No more than one pint of muriatic acid should be added to every 5,000 gallons of pool water at one time to reduce alkalinity. Sodium bisulfate is an acid available in dry form and will serve the same function as muriatic acid.

Soda ash (sodium carbonate) is a common chemical used to raise pH (make it more basic).

Muriatic acid should be diluted by adding it to cold water in a plastic bucket before adding the solution to the pool water. Concentrated muriatic acid is heavier than water and may sink to the bottom of the pool. Always add the diluted solution at least 12 inches from the pool wall or steps to avoid etching or discoloration of the finish. Usually the solution mixes better when poured slowly in front of an inlet fitting where the water is returning to the pool. In this way, the diluted chemical is diluted further with the circulating pool water. If there is a bottom drain in the pool, care should be taken to add muriatic acid away from the drain.

Precautions: Always handle muriatic acid with care. If the acid spills on your hands or clothing, wash it off immediately with plenty of water. Both muriatic acid and wet sodium bisulfate are very corrosive.

Chemicals to Control Total Alkalinity

Pool water should be tested for total alkalinity (basicity). Total alkalinity is a measure of the amount of alkaline chemicals or “buffering” agents in the water. Total alkalinity refers to the degree of resistance of pH change in the pool water. The proper total alkalinity level is between 80 ppm and 120 ppm.

If total alkalinity is low (below 80 ppm), the pH of the water will fluctuate widely and pool plaster may tend to etch. Low alkalinity makes pH control difficult.



Water Chemistry Parameters, ppm				
	MINIMUM	IDEAL	MAXIMUM	FREQUENCY OF TESTING
Free Chlorine, ppm				
Pools	1.0	2.0–4.0	— The U.S. EPA has established a maximum chlorine level of 4.0 ppm for re-entry of swimmers into the water. However, state or local health codes may allow or require levels above 4.0 ppm.	Daily
Spas	2.0	3.0–4.0	— The U.S. EPA has established a maximum chlorine level of 4.0 ppm for re-entry of swimmers into the water. However, state or local health codes may allow or require levels above 4.0 ppm.	
Total Bromine, ppm				
Pools	1.0	2.0–3.0: Residential Pools 3.0–4.0: Public Pools	5.0	Daily
Spas	2.0	2.0–4.0: Residential Spas & Swimspas 4.0–6.0: Public Spas & Swimspas	6.0	
PHMB (Biguanide)*, ppm as product				
	30	30–50	50	Weekly
<small>* Hydrogen Peroxide should be used as an oxidizer with PHMB</small>				
pH				
	7.2	7.4–7.6	7.8	Daily
Total Alkalinity				
	60	80–120	180	Weekly