Water Chemistry Training

Handling and Storage of Chemicals.

The chemicals needed for your spa to help make it clean, disinfected and more attractive to use are potentially dangerous and may present some hazards if not used properly. Carefully follow the manufacturer's instructions for the use and storage of chemicals. In general, here are some tips for chemical use and storage:

Usage

Before using chemicals, read the labels and directions carefully. Follow label use instructions. Hand must be clean and dry... always wash hands after handling chemicals. Use plastic, glass, china or enamelware utensils and pails only and be sure they are clean and dry before using...**Never use metallic utensils.** Add chemicals to water. Never add water to chemicals. Always add the chemicals directly to the pool water, either in a suitable feeder, distributed across the surface of the pool, or diluted and poured into the water. **Follow label use instructions.** When preparing water solutions for feeder application (e.g., disinfectant or soda ash), pour the chemical slowly into the appropriate amount of water, stirring constantly to provide mixing and dilutions. Never add chemicals to the pool water while swimmers are using the pool. Keep all chemicals out of the reach of children. Never mix chemicals together. Use a clean scoop for each chemical, and never combine material from "old" and "new" containers. Never reuse old chemical containers. Wash out empty disinfectant containers before disposing, to eliminate danger of fire, explosion or poisoning. Carefully clean up any spilled chemicals with large amounts of water, to dilute and wash away the chemicals. Check with local authorities before sending disinfectants and pH adjustment chemicals to the sewer as waste. Do not inhale dust or fumes from any pool chemicals. If necessary use protective devices for breathing, handling and eye protection. Promptly wash off any residues which get on your skin. Test the water in your pool with a reliable test kit on a schedule recommended by your pool professional. As a rule, the more people who use your pool, the more frequently you should test the water. Add the necessary chemicals according to the test results and the manufacturer's instructions. Chemicals for test kits should be replaced each year. **If you have any questions regarding safe handling, storage or use of pool chemicals, contact the manufacturer.**

NOTE: Pre mix chemical to be added into a large plastic bucket of water and then add to spa as a liquid, adding granular products may damage spa.

NEVER MIX TWO OR MORE CHEMICAL TOGETHER AT ONCE

Storage

Chemical reagents for test kits should be replaced each year. Keep the original lids on all chemical containers and make sure the lids are closed tightly when not in use. Do not stack different chemicals on top of one another. Keep liquid chemicals away from dry chemicals. Keep apart chemicals which are different forms of oxidizing compounds. Physically separate all different forms of chemicals. Store your pool chemicals in a clean, cool, dry, well-ventilated area preferably off the floor, to prevent contamination from other materials. Especially, do not store chemicals near the pool heater. Keep them away from chemicals and equipment used for garden and lawn maintenance. Keep acids away from other chemicals. Keep all chemicals out of the reach of children. Do not store your pool chemicals where other flammable items may mix with them. For example, a mixture of pool chemicals and fertilizer can cause a fire or explosion. Wash your hands thoroughly after using.

Water Balance

Water balance is extremely important to spas. Balanced water affects many different aspects of water chemistry.The main factors affected are water clarity, or pH bounce, spa damage.

Water balance consists of, Alkalinity, pH, Sanitation,Calcium Hardness, Total Dissolved Solids and Filtration

-Total Alkalinity 100 ppm (80 to 120 ppm)

Total alkalinity is the measure of the amount of alkaline salts in the water, which give water the ability to resist changes in pH or buffer the water from wild pH swings.

-pH 7.5 (7.2 to 7.6)

The term "pH" is a scale of measurement to tell us how acidic (corrosive) or basic (alkaline) the water is. It essentially ranges from 0 to 14, although the extremes of 0 or 14 are never experienced with pool water. pH of 7 is neutral, that is, the water is not acidic nor is it a base. The ideal range for a pool or hot tub is 7.4 - 7.6, slightly on the base side which assists with bather comfort, as the pH of the human eye is about 7.5..

-Sanitation 2.5 ppm (1.5 to 3.5 chlorine)

A product the effectively kills allege and bacteria and other nitrogen based compounds Such as Chlorine, Bromine ect

-Calcium Hardness 200 (100-400)

Calcium Hardness a calcium level of 150ppm - 300ppm. Soft water is aggressive and will cause pitting and etching of concrete, grout or plastered surfaces as it seeks to dissolve calcium into the water from whatever contact source.

-Total Dissolved Solids (TDS)

Total dissolved solids (TDS) is a measure of how well used the water has become more accurately it is a measure of the amount of dissolved matter in the water. High TDS (1,500 ppm and higher) can interfere with the sanitizer's ability to combat bacteria growth.

Filtration

Filter turn over rates, water movement and water circulation

are critical to maintain water clarity and control algae by continually getting

the sanitizer to all the water and surfaces in the spa.

Adjusting Alkalinity

Total alkalinity is the measure of the amount of alkaline salts in the water, which give water the ability to resist changes in pH or buffer the water from wild pH swings. In water that contains no buffering ability, the pH can wander dramatically with the addition of small amounts of acids or bases (alkali), or other pH altering agents like chlorine or bromine.

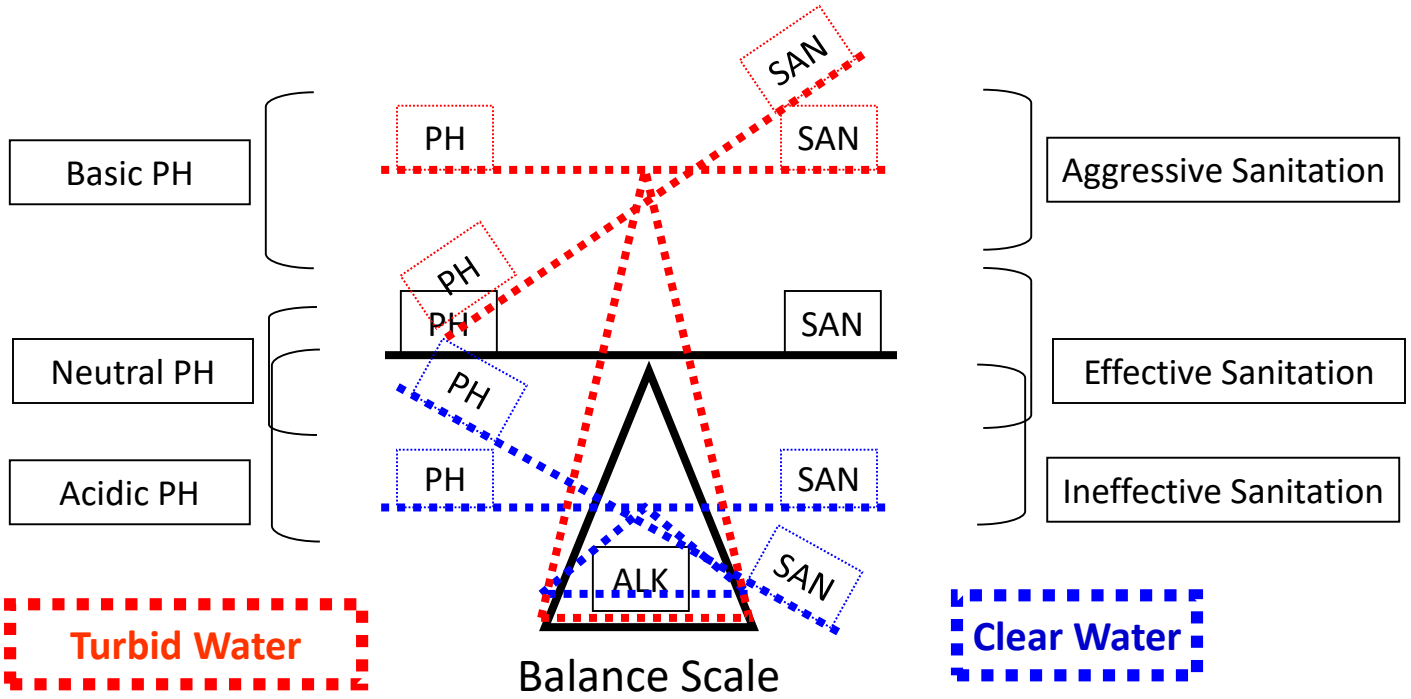
If the alkalinity is in the proper range (80-120 parts per million), the pH will hold steady and pH bounce will be eliminated. However if the alkalinity is to high, the pH levels may drift up into higher levels, leading to scaling water conditions or make it to difficult to adjust the pH. To increase the Alkalinity use Baking Soda (sodium bicarbonate 100%).

Sodium bicarbonate is required to raise the alkalinity. Use small amount 1 to 3 TBS at a time for adjustment

To decrease the alkalinity using Muriatic Acid (HCl). **Acid, Caution!** **(Only service tech should use this product)**

Note Muriatic acid is used to both lower pH and Total Alkalinity. The technique of adding this acid determines which will **To decrease the alkalinity using Dry Acid (Sodium Bisulfate 93.2% The spa needs to be turned off and wait 10 minutes before adding pour the required amount of Muriatic acid into the middle of the spa and leave for 10 minutes before powering back up spa.**

REMEMBER: The spa must be allowed to rest for 6 to 8 hours before a accurate test can be made!



Calcium Hardness.

"The Langlier Index of Saturation",states you need a calcium level of 150ppm - 300ppm. Soft water is aggressive and will cause pitting and etching of concrete, grout or plastered surfaces as it seeks to dissolve calcium into the water from whatever contact source.

However calcium's purpose is not to prevent the water from being corrosive (as that is what the pH is for), but rather to add a temporary level of protection to the surfaces that come into contact with corrosive water, particularly heaters, metal fittings and concrete pool surfaces. The way calcium does this is by leaving a thin calcium film on these surfaces, when the water balance of pH, alkalinity and calcium is ideal. If your pH does drop below 7 (ideal is 7.4-7.6) the corrosive water has to first etch the calcium film off before it can corrode the metal or concrete surfaces adding a degree of temporary protection to these vulnerable surfaces.

It should be noted that if the water balance is not right, for example the pH is to high, then calcium can cause excessive scaling. This scaly build up starts in the heater and in extreme condition leaves a chalky residue or scale at the water level and in the filters as well as causing cloudy water. When this scale builds up excessively on the heater or in the heat exchangers, then the calcium acts as an insulator causing the heater to be inefficient or even worse overheat and burn out on an electric heater, or cause a heat exchanger meltdown on a gas heater.
There are chemicals that prevent or reduce scaling when your pH goes up or your calcium levels are to high, but at the same time it reduces the beneficial effects of the calcium hardness in addition many brands of water softeners promote foaming with extended use, making you wonder why you put calcium in, in the first place.

When conditioning your water it is always best to adjust alkalinity first, calcium hardness second and finally the pH as the pH is affected by the amounts of calcium and alkalinity in the water.

To Reduce Calcium Hardness:

Dilute pool or spa water (partially drain and refill)
Tri-Sodium Phosphate (TSP) could be used to precipitate calcium out of the water, but it is not recommended due to it causes algae bloom (the phosphates are fertilizer for algae).

To increase the Calcium Hardness

Use Calcium Chloride (at 77%). Note: Calcium Carbonate is also commonly used.

Calcium Inhibitors

If high calcium levels is prevalent in your area a source of better water is needed

Soft water from a water conditioner will give you low calcium level water but it will add salt to the water raise the TDS, may not allow the sanitizers to work correctly and can cause cloudy water

PH

The term "pH" is a scale of measurement to tell us how acidic (corrosive) or basic (alkaline) the water is. It essentially ranges from 0 to 14, although the extremes of 0 or 14 are never experienced with pool water. pH of 7 is neutral, that is, the water is not acidic nor is it a base. The ideal range for a pool or hot tub is 7.4 - 7.6, slightly on the base side which assists with bather comfort, as the pH of the human eye is about 7.5.

Low pH causes; corrosive water, pitting of concrete, metals dissolve and staining of pool or spa walls. It also affects or increases; chlorine loss, vinyl wrinkles, skin and eye irritation.
High pH causes; Scaling water, mineral precipitate out of the water (namely calcium, copper, iron etc...), plugged filters, cloudy water, reduced circulation. It also affects or increases chlorine inefficiency along with skin and eye irritation.

How to adjust pH;

REMEMBER: the alkalinity level must be correct or the pH will bounce back to the original level before the adjustment

When conditioning your water it is always best to adjust alkalinity first, calcium hardness second (if desired or used) and finally the pH. *Amounts of chemical vary due to such things as buffering effect of the alkalinity of the water etc...However most containers do give a guideline amounts to use, based on a correct water balance and alkalinity. If still unsure then consult your local dealer.*

To increase pH :

Use soda ash (sodium carbonate) or caustic soda (sodium hydroxide), to name a few. Increasing pH using baking soda (sodium bicarbonate) is not recommended as this also increases alkalinity which may not need to be raised, but can be done if your careful.

To decrease pH:

Use dry acid (sodium bisulfate). Mix in a5 gal container and slowly add to spa with jets on high

REMEMBER: The spa must be allowed to rest for 6 to 8 hours before a accurate water test can be made!

Battery Acid, Caution! (Only service tech should use this product)

Note Muriatic acid is used to both lower pH and Total Alkalinity. The technique of adding this acid determines which will occur.
To maximize the lowering of the alkalinity and minimize the pH drop, slug the acid, i.e. pour the acid in columns into the water.
To maximize the pH drop and minimize the alkalinity drop, the acid should be walked, i.e., spread about the pools surface as much as possible.
Total amount of acid given from the tables must be applied over time to avoid low pH. Initially slug 40%, 25%, 15%, and then the final 15%, waiting a few days between each addition to allow for pH recovery.

Sanitation

Chlorine Trichlor (Tabs)

Trichlor (trichloro-s-triazinetrione, chemical formula Cl3C3N3O3) contains the highest percentage of available chlorine of all the types of chlorine compounds. Trichlor is produced by drying and cooling the sodium salt of cyanuric acid in the presence of chlorine gas. The resulting compound Provides 90-percent available chlorine.

Trichlor is mostly available as a l-inch tablet, 3-inch tablet, a stick or a cartridge. It has a long shelf life, and it is very slow dissolving, so it works extremely well in floaters and erosion-type feeders. It can be used for regular chlorination but not for superchlorination, because it dissolves too slowly.

Because use of trichlor can cause a build up of cyanuric acid in the pool water, it is necessary to check the cyanuric acid level more frequently and to partially drain and refill the pool if the level exceeds 100 ppm.

The pH of trichlor is 2.8-3.0, so it causes an acidic condition to occur in the pool -- that is it lowers ph. It is therefore necessary to add about 4 1/2 ounces of soda ash for each pound of trichlor used.

Because trichlor already contains cyanuric acid, it does not require addition of that chemical (Chlorine Lock)

REQUIRES adjustments to the alkalinity level more than bromine because of the pH of the chlorine but offers clear water with very little turbidity when the jets are on high.

Bromine

One-part bromine or bromine tablets are actually a compound of bromine and chlorine (1-bromo-3-chloro-5,5-dimethylhydantoin also called BCDMH), (chemical formula BrClC5H6O2N2,). The chlorine in the tabs is used to oxidize the bromine to produce hypobromous acid and hypobromite ions. Bromine tabs provide an available bromine level of about 2/3 or 61-65 % and an available chlorine level of about 1/3 or 27-31%.

One-part bromine (BCDMH) is mostly available as a 1-inch tablets, cartridges or packets. It has a long shelf life, and it is very slow dissolving, so it works extremely well in floaters and erosion-type feeders.

However after the hypobromous acid destroys bacteria, algae or other organisms, or is destroyed itself by sunlight it returns to being bromide ions, which can be reactivated by adding an oxidizer. The hypobromous acid can also combine with ammonia and nitrogen compounds in the water from swimmers to form bromamines. However, these bromamines are active sanitizers, and they do not smell like their foul-smelling counterparts – chloramines.

Although bromine itself is an oxidizer, it is not strong enough by itself to oxidize or destroy ammonia and nitrogen compounds in the water. It is therefore necessary to oxidize these swimmers wastes and reactivate the bromide ions by adding a stronger oxidizer -- usually any form of chlorine or a nonchlorine shock (potassium peroxymonosulfate).

The pH of bromine tabs is 3.6, so it causes an acidic condition to occur in the pool -- that is, it lowers the pH. It is therefore necessary to add about 3 1/2 ounces of soda ash for each pound of bromine tabs used.

REQUIRES less adjustments to the alkalinity level chlorine because of the pH level but can cause fuzzy water clarity and turbidity when the jets are on high.

Alternate Sanitation

Ozone Gas

Ozone is a gas, a modified highly reactive form of oxygen (chemical formula O3) that is one of the strongest oxidizers and disinfectant available. It is stronger than chlorine, bromine, hydrogen peroxide and hypochlorous acid. In fact, against a bacterium called E.Coli (commonly used to measure the effectiveness of sanitizers), ozone kills 25 times more powerful than hypochlorous acid and about 500 times faster.

Baquacil and BaquaSpa

Although Baquacil and BaquaSpa aren't true oxidizers they are a for of sanitizer and some info on the product are as follows:
Unlike chlorine which acts as an oxidizer and sterilizer in the water, polyhexamethylenebiqunaide (PHMB) based sanitizers destroy the bacteria cell by locating and binding to bacteria cell surfaces. It then attacks and overcomes the outer bacterial cell wall. Once this wall has been compromised, the membrane, the inner cell membrane, is destroyed. This destruction allows the cell contents to disperse into their surroundings where they are likely broken down into their elemental parts by a non-chlorine oxidizer or shock (Baqua Shock), which is a hydrogen peroxide based compound. It should be noted that this system is very incompatible with standard systems including chlorine and bromine, and can be difficult to convert back to the traditional system.

Enzymes (This product is not approved for use in Canada.)

I will give more details at a later date but this is the just of it at this point. Typically there are many forms of enzymes out there. They are not considered a sanitizer at this point that I know of. Their primary use of these products is to increase the speed at which body oils, contaminants like suntan lotions and certain combined products biodegrade. Reducing the demand on other sanitizers like chlorine or bromine. Enzymes are used in digestion of you stomach, making beer, breaking down composts, cleaning oil spills, etc... They are for the most part completely non toxic, natural and may be a nice addition to many chemical programs.

Magnet Water Conditioners

There are two distinct sides to this one. Although relatively new in the pool and spa industry magnet have been used for more than 60 years to prevent scale formation in industrial boilers. Many pool and spa service technicians are convinced that attaching magnets to the circulation line improves the quality of the water. There are many claims to the abilities of magnetic devices:

Ionizer Maintenance

The residual provided by an ionizer comes from a gradual erosion of the electrodes. This is true for copper/silver, bi- metallic and all copper systems. Depending on the type, electrode life is estimated at one to two years. Scale build up on the electrodes is another question that draws different responses from ionizer manufacturers. One says that high calcium levels will result in scale forming on the electrodes and that applying a mild acid solution and hosing it off will remove the scale. Another says that ionization inhibits scale formation both on the electrodes and the pool wall and equipment. In fact it is useful in removing scale that has formed prior to the installation of an ionizer. If properly maintained and sensibly applied an ionizer system seems capable of satisfying basic sanitation needs. Unfortunately too many systems have been marketed in the past by firms that ignore the total needs of the pool and spa water. By itself an ionizer is able to deal with algae and bacteria but problems with water balance, disposal of organics and proper filtration are not things that an ionizer can handle by itself. Manufacturers are careful to stress the importance of proper filtration and filter maintenance. They recognize the need to deal with oxidizing organics but differ in their approach to the problem. If you're seriously looking into an ionizer system our advice is to evaluate not only the unit itself but the entire program put forth by the manufacturer.

Filtration

Turn Over Rate

Also called turnover rate - The period of time (usually in hours) required to circulate a volume of water equal to the volume of water contained in the spa. Spa capacity in gallons, divided by pump flow rate through the filter in gallons per minute (gpm), divided by 60 minutes in 1 hours, will give turnover rate.

Commercial spa must turn over once every 15 to 18 minutes to ensure proper sanitation and clarity

Filter Cleaning

The rate at which the water is travelling through the filter, expressed in U.S. gallons per minute (gpm) per square foot of filter area. The filter as it becomes filled with debris will allow less water to pass through the material and a lower turn over rate will be a result.

A Filter bypass will not solve this dirt filter problem because the bypass allows the water to miss the filter and the debris now ends up back in the spa and interferes with sanitation and its ability to kill the algae and bacteria.

Total Dissolved Solids (TDS)

Total dissolved solids (TDS) is a measure of how "tired" or well used the water has become more accurately it is also a measure of how many salts are in the water. As more chemicals are added, the higher the TDS level. High TDS levels indicates that a partial draining and addition of fresh water (of a lower TDS value or level) is required to reduce the continued high readings. All other factors being equal, high TDS in water have an increased tendency for the water to cause corrosion even at pH levels that are ideal. Most pools/spa water has a TDS less than 2000 ppm, which has little effect on water balance. As spa water in particular ages and chemicals are continually added, the TDS does become a factor, hence the reason spas need to be drained frequently. The more you use your tub, the more chemicals that are required and the more frequently the water should be drained and refilled or at least diluted. Also as the TDS build up in the water they can displace the calcium hardness in the water slowly making the water soft.

Specialty Products Inorganic

There are two major kinds of contaminants in pool and spa water- "Organic and Inorganic".

Organic contaminants in a pool or spa are things like bacteria, algae and bather waste, which are objectionable because they can affect the health of swimmers and bathers. Organic contaminants are controlled by such things as chlorine, bromine, ozone, ionizers, ultra violet sterilizers, algaecides and non-chlorine shock treatments chemicals.

Stain Inorganic

Discoloration and sometimes cloudiness in a spa are caused by minerals coming out of solution, called *precipitation*.. If the precipitated metals have a color are smoother and are deposited on the pool walls, this is called staining. Staining and or colored water is caused by heavy metals like copper, iron, manganese. Quite often when you first fill a spa for example the water is colored green, from the copper in the source water pipes (not as common in well water sources). This is the same thing that causes a bath tub to get green stains in the household bath tub. You will notice that this green in your bath tub occur quicker when you bath with soap and or bath salts as they raise the pH of the water causing the copper minerals to come out of solution depositing on the bath tub surface. If chlorine was present in any quantity then the copper ions would form copper oxide and become a grey black color.

All these minerals come from the source water or from the pool or spa equipment itself if the water is out of balance. The minerals when in water form oxides, hydroxides, carbonates, sulfates, silicates and phosphates. Depending on the chemicals you are using in your water treatment program, you may be adding some more of them each time you treat the water, as with copper or silver algaecides, ionizers electrodes, chlorine generators electrodes or evens forms of chlorine like calcium hypochlorite. High levels of iron will cause brown stains to from in the spa

Using a sequestering agent will suspend the minerals and usually stop the staining and I some cases reverse the staining

Scale Inorganic

The precipitated minerals in the water form hard crusty deposits on the heater and sometimes on the walls , this is called scaling or scale. Scale and or cloudy water is often formed from incorrect water balance and or high calcium or magnesium levels in the water. When calcium hypochlorite chlorine is used for sanitizing or shocking spa water, the calcium in this chemical often clouds the water temporarily as the calcium dissolves into solution.

Using a inhibitor will usually stop this scale formation

Specialty Products Organic

Organic contaminants in a pool or spa are things like bacteria, algae and bather waste, which are objectionable because they can affect the health of swimmers and bathers. Organic contaminants are controlled by such things as chlorine, bromine, ozone, ionizers, ultra violet sterilizers, algaecides and non-chlorine shock treatments chemicals.

Clarifiers

Foggy water or turbid water can be cause by many factors and combinations of these factors. Some of the main factors that will cause foggy water in order of most likely are : Low water level, lower sanitizer levels, dirt filter, chemical added, pH to high, TDS level to high. The most important point to focus on is finding the problem causing the foggy water and try to correct it.

Using a coagulant will allow the small partials to be joined together so the filter can remove them faster

Oxidizers

Non-Chlorine Shock

The active ingredient in these non-chlorine shock products is potassium peroxymonosulfate, also known as permonosulfate. Like chlorine, permonosulfate is an oxidizer that will destroy organic contaminants such as ammonia in spas. However, permonosulfate compounds do not kill or disinfect they simply control organics and combined chlorines, helping assure that the chlorine can do its job as a sanitizer. Permonosulfates oxidize by using the element after which oxidation got its name -- oxygen. Oxygen is a pure form of oxidizer.

Using a oxidizer will stop smell and help to keep the water clear.

Super Chlorination

When chlorine is added to the water, it combined with these ammonia and nitrogen compounds to form chloramines. These chloramines (also known as combined chlorine) smell bad, and they are eye and body irritants. Not only that, they also disable the free chlorine. Chloramines are still disinfectants, but they are 40 to 60 times less effective than free chlorine. And in a swimming pool or spa, we want a fast, effective kill. Therefore, we want the presence of a lot of free available chlorine. So we need to get rid of the combined chlorine. In pools that are sanitized with bromine, the odour problem does not exist, and combined bromine (bromamines) are as effective as free bromine for disinfection's. Nevertheless, it is still necessary to periodically oxidize the organic wastes to prevent them from building up and becoming sources of irritation.

The first step in dealing with the problem of combined chlorine is to test the water to see how much of the chlorine in the water is free and how much is combined. The commonly used OTO test will not perform this task -- it can only tell you the total chlorine level and can't differentiate between free and combined chlorine. However, a DPD test kit or a spa test strip will do the job.

Glossary of Terms

Acid

Chemicals such as Muriatic acid or sodium bisulfate used to lower pH or alkalinity.

Acid Demand

A measure of the amount of acid required to reduce pH to a predetermined level. This can be accomplished by use of an acid titration procedure (Acid Demand Test)

Algae

Microscopic aquatic plant life which can grow on pool surfaces or float freely in the water though harmless to swimmers the presence of algae discolours the water and indicates improper sanitization. Black algae which grows on pool walls and floor can actually crack plaster finish.

Algaecide

A chemical used to kill existing algae or prevent the growth of algae.

Alkalinity

See Total Alkalinity.

Bacteria

Very small organisms continuously entering the water via swimmers, dust, etc. Without proper sanitization pools and spas are a perfect breeding ground for bacteria, many of which can cause disease or infection.

Balanced Water

Water that is neither corrosive nor scaling (in relation to pH, total alkalinity, calcium harness, and temperature factors). The Langelier Index for perfectly balanced water equals zero.

Base

A chemical which raises pH when added to the water, like sodium carbonate or caustic soda.

Base Demand

A measure of the amount of alkali material required to raise pH to a predetermined level. This can be accomplished by use of a base filtration procedure (Base Demand Test).

Bather Load

The number of individuals using a pool or spa in a 24 hour period and the pool and spas principal source of bacterial and organic contamination.

Break Point Chlorination

The process of shocking the water with significant quantities of chlorine to oxidize all contaminants and organic wastes and leave all remaining chlorine as free chlorine.

Glossary of Terms

Bromine

Chemical sanitizer that kills bacteria and algae.

Buffer

Chemical that resists pH change, e.g. sodium bicarbonate

Calcium Hardness

A measure of the calcium salts dissolved in water.

Caustic Soda

Also known as sodium hydroxide and is used to raise pH.

Chloramines

A group of chlorine ammonia compounds formed when chlorine combines with organic wastes in the water. Chloramines are not effective as sanitizers and are responsible for eye and skin irritation as well as strong chlorine doors (also known as Combined Chlorine).

Chlorine

Chemical sanitizer that kills bacteria and algae.

Chlorine, Combined

The reaction product of chlorine with ammonia or other pollutants, also known as chloramines.

Chlorine Demand

Amount of chlorine required to react on various water impurities before a residual is obtained.

Chlorine, Free

Chlorine available to kill bacteria or algae. The amount of chlorine available for sanitization after the chlorine demand has been met. Also known as chlorine residual.

Conditioner

See Cyanuric Acid

Corrosion

The destruction of metal surfaces mostly due to low pH (below 7.0) and or low alkalinity.

Cyanuric Acid

Chemical used to prevent the decomposition of chlorine by ultraviolet (UV) light.

Glossary of Terms

Disinfect

To kill and inhibit growth of harmful bacterial and viruses in pool and spa water.

Dry Acid

A granular chemical used to lower pH and or total alkalinity.

Langelier Index

A mathematically derived factor obtained from the values of calcium hardness, total alkalinity, and pH at a given temperature. A Langelier index of zero indicates perfect water balance (i.e.., neither corroding nor scaling).

Magnesium Hardness

A measure of the magnesium salts dissolved in water - not a factor in water balance.

Muriatic Acid

An acid used to reduce pH and alkalinity. Also used to remove stain and scale.

Non Chlorine Shock

An oxygen based shocking compound. Non Chlorine shock is fast dissolving so it allows swimming just 15 minutes after use. **Organic Wastes**

Wastes such as saliva, urine, perspiration and sun tan oils which swimmers introduce into the pool or spa. Most organic wastes will not filter out and must be removed by shocking/oxidizing.

OTO

Test Regent used to test bromine and chlorine in pool and spa water.

Oxidizing

The process of breaking down organic wastes into simpler elemental forms or bi products. Also used to separate combined chlorine and convert it into free chlorine.

pH

A measure of the acidity of water. The pH scale runs fro 0 to 14 with 7 being the mid point or neutral.. A pH of less than 7 is on the acid side of the scale with 0 as the point of greatest acid activity. A pH of more than 7 is on the basic (alkaline) side of the scale with 14 as the point of greatest basic activity.

pH of Saturation

The ideal pH for perfect water balance in relation to a particular total alkalinity level and a particular calcium hardness level, at a particular temperature. The pH where the Langelier Index equals zero.

Phenol Red

Chemical reagent used for testing pH in the range of 6.8 - 8.4.

Glossary of Terms

ppm

Abbreviation for parts per million.

Sanitizer

A chemical which disinfects (kills bacteria), kills algae and oxidizes organic matter.

Saturation Index

See Langelier's Index

Scale

Crust of calcium carbonate, the result of unbalanced pool water. Hard insoluble minerals deposited (usually calcium bicarbonate) which forms on pool and spa surfaces and clog filters, heaters and pumps. Scale is caused by high calcium hardness and/or high pH. The regular use of stain prevention chemicals can prevent scale.

Shock

Also known as superchlorination or break point chlorination. Ridding a pool of organic waste through oxidization by the addition of significant quantities of a sanitizer.

Soda Ash

Chemical used to raise pH and total alkalinity (sodium carbonate)

Sodium Bicarbonate

Commonly used to increase alkalinity of water and stabilize pH.

Sodium Bisulfate

Chemical used to lower pH and total alkalinity (dry acid).

Sodium Hydroxide

Also known as caustic soda, A by-product chlorine generation and often used to raise pH.

Stabilizer

See Cyanuric Acid

Superchlorination

Application of large dosages of chlorine to destroy build up of undesirable compounds in water.

Titration

A method of testing by adding a reagent of known strength to a water sample until a specific color change indicates the completion of the reaction.

Glossary of Terms

A method of testing by adding a reagent of known strength to a water sample until a specific color change indicates the completion of the reaction.

Total Alkalinity

A measure of the acid-neutralizing capacity of water which indicates its buffering ability, i.e. measure of its resistance to a change in pH. Generally, the higher the total alkalinity, the greater the resistance to pH change.

Total Dissolved Solids (TDS)

The accumulated total of all solids that might be dissolved in water.