

**Now you own a hot tub.** That's great! No really! I'm serious... I know you've had some enjoyable moments in it, but now it's time to deal with the unavoidable facts. Your hot tub water is cloudy, smelly and maybe some strange color. Those test strips aren't helping much. You called or stopped by some hot tub company and they convinced you to buy another concoction of their magic fix-alls. Your mind is hazy because that clerk seemed to be rushing you, something about another customer and a new tub sale. You arrive home and try to figure it all out. Did the clerk say to add a capful or was it 1 tablespoon of that other stuff? Were you supposed to pour the whole bottle or was it half? Why does it have to be so complicated? You continue to battle the chemistry and the water still seems to be the same witch's brew of strange colors, smells and you've wasted more time and energy than you have ever seen **in** the tub relaxing! So now what? You might have even done what a lot of people do. You just gave up and went back to staring at your tub. Now it's just a big expensive ornament on your deck or patio and a painful memory covered with a tarp. STOP! This is not the way it's supposed to be! Dust it off, chase away the frogs, snails and slugs and let's take a good look.

**Water...** The one key element of the illustrious hot tubber that's the most abused and neglected! The last thing we hot tubbers want to do is spend our free time trying to get the tub ready. We just want to jump right in and... "ahhhh, relaaax... oh, that feels so good on my sore aching muscles". But wait! Now I'm itching and what's that red splotchy rash? I put stuff in it several days ago, or was that last week? A little of this and dash of that! Isn't that good enough? Hold on... before you kick your sandals off and dive in feet first let us talk about that water you are going to soak in. Ok, you filled it up last month from the same hose your dog drinks from. That's fine. It's probably the same water you drink too (maybe not from the hose). And it's not making you sick drinking it, now is it? Well let's stop and look at that water... Tap water is treated before it gets to you and it is clean and free of any nasties that might make you sick. So you filled your hot tub and it looks perfect... nice and clear, no smells, just right! STOP! WAIT! HOLD ON! Let's take another look. While it might look okay and smell okay right now, it's not going to stay that way long. You just finished digging in the garden and stuck your hand in the water as you walked by, to feel whether it was warm enough yet as you headed to the bath to cleanup before you get in the tub to relax. (Now let's put on our Microscope Goggles and zoom to microscopic view) There's some alien looking bacteria doing the back stroke. Look how cute! It's got its hot tubbing outfit on... Geez, it's not alone... hey... look... there are hundreds of them! Hey, they're multiplying. They're taking over your spa! HELP, what do we do now? (Remove the goggles now) Hey... where's all the bugs, the water still looks clear and smells fine. Just wait... In about 12-24 hours that water is going to start clouding and might even develop a not so pleasant aroma if you don't sanitize the water and balance the chemistry. The bugs (bacteria) are having a party in your tub and you are invited to join them. Yeah, right... You're going to be life of their party. No way! This is YOUR hot tub and no one invited them. So what do you do? Now that we set the stage for you, let's look at the stuff that we never quite seem to get straight.

There are 5 basic things that need to be checked out:

1. **The Water's Hardness**, also called Calcium Hardness, is a measurement in parts per million of Calcium metals in the water. Water needs metals in the water to remain balanced, about 200-400ppm. If the water is low on calcium, then the water is going to have a corrosive effect on the hot tub and adversely affect the rest of the water's

chemistry. Total Alkalinity and pH will be directly affected and until you get the hardness level back in range you will not win the water chemistry battle. In and around the coast and peninsula, the hardness level is very low. Tests I have performed on tap water have consistently shown levels below 100 ppm. This causes a multitude of problems ranging from cloudy water, foaming, problems maintaining pH and total alkalinity, damaged heaters, leaking seals, deteriorated plastics like jets, pillows and even permanent damage to tubs.

2. **Total Alkalinity (TA)** is the test that tells you (in parts per million) what the total alkalinity of the water is. The acceptable range is 80-120ppm. TA is like shock absorbers on your car. We remember "The Boat". You know the one... that big old car that belongs to your friend, boss, Uncle Fred, and it is fun to ride because it's the ultimate cheap-thrill roller coaster. You feel every little pothole or dip with amazing longevity of the bouncing rock and roll from the bad shocks and springs on that baby. Your new car, on the other hand, drives the same section of road and you hardly feel a thing. The same is true concerning TA and your spa. If the TA is either too low or too high, then any minor change in chemistry can have a drastic affect on pH. In and around the coastal area, TA is typically as low as 30 ppm on tap water. This has a direct affect on PH.
3. **pH** (Getting really techy... This is a measure of how acidic or alkaline a substance is. The initials pH stand for "Potential of Hydrogen." Acids have pH values under 7, and alkalis have pH values over 7. If a substance has a pH value of 7, it is neutral -- neither acidic nor alkaline.) Okay way too much techy stuff there! The pH around this area is typically high right out of the tap or hose but, I've seen it range from 6.8 to 8.4 in testing I've done from various areas along or near the coast. The acceptable range for us humans and our hot tubs is from 7.2 to 7.8. If the water has a low pH (below 7.2), then it becomes corrosive. That means it can be irritating to your skin and damaging to hot tub components as well. If the pH is too high (above 7.8) then it becomes corrosive and can also cause discomfort and damage equipment.
4. **Sanitizer Level (Chlorine (CL), Bromine (BR), Alternative Sanitizers)** is a test to determine what level in parts per million is being maintained to keep those bugs from partying in your tub. A bug free tub is definitely the goal. In order to accomplish this you have to maintain the necessary amount of sanitizer needed to keep bacteria from growing. Too much sanitizer on the other hand can also be a problem. Remember, you are not trying to sterilize yourself, just the water. So be sure to follow the directions provided on all bottles before adding them to your spa.
5. **The Filter** is the key component that often is left to fend for itself. Some are easy to access while some are hidden away under the skirting. Some tub manufacturers use multiple filters. Regardless of the type or number of filters or their location, each and every one must be cleaned regularly and thoroughly. Neglecting your filter(s) will have an adverse affect on the water condition. Reduced water circulation, poor jet action, poor or even no heater performance are all a direct result of a dirty clogged filter.

Let this brew in your mind while we step back and look at your hot tub a moment. Ultimately the goal is simply to keep the water balanced and clean, right? So why is it so complicated? Why does it never seem to be as easy as the hot tub store said it would? Treating the water to maintain a balance is not an art nor does it require a degree in chemical engineering, it's just a matter of

understanding the order and frequency of treatment and cleaning and having an understanding of the acceptable ranges your water's chemistry is supposed to be in.

The following guideline will steer you toward a better tub experience and is based a freshly cleaned and refilled tub.

1. **Test your water using a good test kit.** This can be strips or liquid type. It should not be outdated (replace each season). Strips should be kept in a dry place and handled carefully to prevent them from getting wet in the container. Liquid test kits should be stored in a cool location not exposed to sunlight. A refrigerator is perfect. As with any test kit, follow the provided instructions to assure accurate readings. Be sure to take your readings in good lighting as poor lighting condition can adversely affect the resulting reading. Remember, this is not rocket science, but it does require closely following instructions to get accurate results. Color Blindness will obviously affect the ability to gain an accurate picture, so if this is a factor then seek assistance from a friend (who isn't color blind) or a Pool/Spa store with testing services. There are also digital test meters available that eliminate color comparison and just give you the results in LCD readout.

Your test kit should, at a minimum, be able to test for:

- a. Sanitizer (Bromine, Chlorine, Alternative Sanitizers)
- b. pH
- c. Total Alkalinity
- d. Water Hardness (Calcium Hardness)

Other tests like may be included in your test kit, but the ones mentioned above are the minimum you should be checking.

2. **Record your test results** and refer to the following acceptable range.

Test	Minimum	Ideal	Maximum
Chlorine	1 ppm	2 ppm	4 ppm
Bromine	1 ppm	2 -3 ppm	5 ppm
Leisure Time Free™ Baqua Spa™	30ppm	40ppm	50ppm
Monopersulfate (MPS)	**see below	**see below	**see below
pH	7.2	7.4 – 7.6	7.8
Total Alkalinity	60 ppm	100-120 ppm	180 ppm
Calcium Hardness	150 ppm	150-400 ppm*	1000 ppm

\*Some calcium hardness (total hardness) charts will reference between 150-500 ppm. While this is widely considered the acceptable range for pools and spas, 150-250 ppm is the minimum preferred range for all residential and commercial hot tubs.

\*\* Be sure you obtain the proper test kit that tests for MPS. The test must be done immediately after adding MPS to determine whether the proper amount has been added for the volume of water you are treating. The typical test kit is measuring approximate levels between 400-7000 ppm. If tested more than several hours after MPS is added, the test may return a very low

reading. **UNDERSTAND THIS.. Monopersulfate (MPS) IS NOT AN EFFECTIVE SANITIZER.** It is intended as a supplemental **SHOCK (OXIDIZER)** to be used in conjunction with adequate and minimal chlorine or bromine. **IT IS NOT TO BE USED BY ITSELF AS A SANITIZER. IT CANNOT BE USED AS A SUBSTITUTE SANITIZER FOR CHLORINE OR BROMINE.** It has a very short treatment cycle lasting no more than about 2 hours. When used in conjunction with the above mentioned sanitizers it greatly reduces the “no swim” time required by chlorine or bromine based shock and is a very efficient oxidizer.

3. When adding product, always follow the instructions printed on each container.
4. DO NOT add more than the recommended dosage of any product.
5. Based on the results of your test, adjust your sanitizer level as needed to achieve the proper level based on the product you are using and its specific instructions.
6. Adjust your water hardness next. It should be within 150-500ppm, ideally around 250-300 ppm
7. Wait several hours before proceeding.
8. Adjust your total alkalinity next. Do not rush this adjustment. It is better to spread out this adjustment over several days. Use small doses to adjust slowly. Range should be between 80-120ppm.
9. Wait 24 hours after final total alkalinity adjustment before attempting to adjust the pH. Range should be between 7.2 – 7.8. This should also be adjusted slowly with small doses over 24 hours.

Okay, I mentioned several different sanitizers. So you are probably wondering why there are so many and which is the best choice for you. That question definitely deserves a well thought answer, but it is not a simple one.

First, the market bears many solutions to your water sanitizing needs and they all have their merits and problems. Each one fits the end result of maintaining clean water, but each requires you to make decisions as to which is the best for your lifestyle and personal needs. I'll briefly cover the basics and include some notes on each.

**Chlorine** is by far the most popular and oldest in use. It is very effective at sanitizing water and comes in many forms of tablet, granular and liquid. It is easy to apply and has a long residual sanitizing affect.

**Pros** – kills all known bacteria and parasites in water, least expensive

**Cons** – Can be harsh when used improperly. Burns away with exposure to sunlight and affects water chemistry requiring use of water balancing products. It can be an issue for sensitive skin and has some environmental impact issues which are hotly debated

**Bromine** has been around for many years as well. It too is very effective at sanitizing water. It does require using a supplemental shock to keep it active.

**Pros** – Kills all known bacteria and parasites in water, less harsh than chlorine, less affect on water balance.

**Cons** – More expensive than chlorine, requires use of chlorine shock or MPS to stay active. Most bromine based products include a larger percentage of chlorine as the activator. It can be an issue for sensitive skin if levels are too high and has some environmental impact issues which are hotly debated

**Monopersulfate** is an oxidizing compound used to activate bromine or as a supplemental oxidizer to quickly oxidize organic waste in the water.

**Pros** - Fast efficient oxidizer for rapid shock treatment of pools and spas with little residual.

**Cons** - Often misrepresented as a sanitizer. NO sanitizing properties whatsoever

**Mineral or exotic metals based sanitizers** like silver and copper have their place as well, but **require** the supplemental use of chlorine or bromine to keep the sanitizer demand at a level that can be maintained by the minerals. These products are reported by their manufacturers to expose trace metals to the water which are reported to kill bacteria.

**Pros** – claims to reduce chemical sanitizer usage, no significant affect on chemistry

**Cons** – Requires the use of supplemental chlorine, bromine at 1ppm to be effective, which sort of defeats the marketing purpose of using it to begin with. These products seem to carry a certain amount of mystery as to their actual effectiveness and recent advertising schemes for some brands would have you believe in the bold print that they are a CHLORINE FREE alternative (meaning NO chlorine is required), but the fine print states you must maintain at least 1-1.5 ppm of chlorine. So this really raises a red flag in my opinion, as the chlorine is going to be doing the work anyway regardless of whether the product is in the tub or not.

**Biguanide Sanitizers** like Leisure Time Free or Baqua Spa are a very effective alternative to Chlorine or Bromine if used exactly as directed.

**Pros** – A strong solution of Hydrogen Peroxide is used to shock the water and a higher level of sanitizer is required. This product is far less harsh than chlorine or bromine and has developed favor with people seeking a truly non-chlorine alternative. Product has very little affect on water balance.

**Cons** – Costly to get started. Cannot be used with any chlorine or bromine based products. Some bacterial outbreaks require total conversion to chlorine to treat and then total conversion back to biguanide product, which can be costly. Regimented treatment is required to prevent bacteria outbreaks and close monitoring of chemistry balance is required as this sanitizer is not effective in unbalanced water. Significant problems exist with bio-film buildup on the waterline and in the plumbing over time, requiring more frequent maintenance and cleanup.

That being said, each product is capable of providing you satisfactory results as long as you follow the manufacturer's recommendations and maintain your water balance as instructed.

The correct product for you is the one that gives you the best results. I cannot recommend one over another as each hot tub is as different as the individual(s) who uses it. While one product may work fine for an individual, that same product may be totally unacceptable for another.

I will say this much. When I come across a customer who is struggling to get their spa in balance and they have the usual box load of products and a confused look, I will often recommend the simplest approach to get them started. Most everyone understands the acronym KISS. "Keep It Simple Stupid". I have seen more shops sell a box load of supplies to their customer with no regard whatsoever to the specific needs of that customer and do nothing more than complicate the issues the customer came in to get resolved in the first place. If you deal with a shop who does not inquire as the specifics of your source water, you are dealing with someone who CANNOT resolve your problems or needs with any intelligent answers. You must know what water issues you have before you can choose the proper products to treat it.

Here is the basic shopping list you must fill to be able to keep your hot tub balanced:

1. Test Strips – Should be able to test for a Sanitizer, pH, Total Alkalinity, Calcium or Water Hardness
2. Sanitizer – Chlorine or Bromine, Mineral or other Alternative product.
3. pH/Alkalinity increaser and decreaser as required with your source water
4. Calcium increaser or decreaser as required with your water source
5. Shock – Chlorine or Monopersulfate or other alternative product
6. Clarifier to assist with keeping your water sparkling clear.
7. Filter Cartridge Cleaner product
8. Plumbing and Jet cleaning/flush product

ALL other products are optional as merely supplemental or support products. **THEY ARE NOT REQUIRED** as long as you maintain basic water quality. Some products like cover cleaners and shell treatments are suitable for protecting your tub and accessories, but those have nothing to do with specific water quality treatment.

We have one more important consideration, how you fit your hot tub's needs into your lifestyle. Is it a hot tub or a bath tub? Many owners neglect their tub and it begins to take on the look of a dirty bathtub. If it's a hot tub, then you need to understand how to treat it like one.

1. Bathe or shower before getting in to limit the introduction of organic waste.
2. Don't wear lotions, oils or creams in the tub.
3. Establish a regular scheduled weekly visit tub-side for cleaning and treatment.
4. Establish the best products suited to your personal needs (allergies, sensitivities, etc.) and stay with those. Remember KISS...
5. Your helpful neighbor or friend who also has a tub is likely an expert on their tub, but definitely NOT on yours. Each and every hot tub is as different as the individuals who use it. While your neighbor or friend may have some good suggestions on how they

manage theirs, be aware that their approach may not work as well for you. Each person's body chemistry varies and the effects on the hot tub will vary as well, so your tub is not going to be the same in treatment as your neighbor's or friend's tub. Your lifestyle will also affect your tub in relation to the time you spend tending it.

6. Your animals may be YOUR best friend, but are definitely not your tub's best friend. Keep your in - tub pals limited to the human type or be prepared for some serious cleaning issues from pet waste and fur clogging up your filter(s) and other vital plumbing areas. Frogs, slugs, salamanders and the like may give your spa that natural look, but floating dead in the water, makes for a nasty source of hot tub slim! Keep them under control and in your pond, rather than stewing in the tub.

So know that we've run the gamut and filled your tub soaked head to the brim with facts, figures and funny (I think so anyway) thoughts concerning you, your tub and life as we know it, I hope this Splog has given you adequate and practical knowledge to better understand and relate to your spa and its needs.

Happy tubbing!