

Reefers Den

Reef Keeping Basics (Phase 1)

MARCH 16, 2015

- ✓ Thorough explanation about cycling
- ✓ Water Parameters checking
- ✓ Purpose of Activated Carbon, GFO, Biopellet
- ✓ Purpose of Different Chemical Filtration
- ✓ Reef Supplement: Their purpose and usage direction (Alpha, Balance, Eight.Four, Calcification, Fuel, Ions, Vibrance)
- ✓ Modifying Skimmer to improve performance
- ✓ Coral Fragging
- ✓ Q & A

WATER PARAMETER

- **What is it?** *What the parameters is.*
- **Why's it Important?** *The importance of that water parameter, and what impacts that parameter has on your tank.*
- **What Value should I Aim For?**
What values you should try to strive for, and why. (Natural Seawater vs. optimal closed system conditions)
- **What do the values mean?**
Importance of each value at certain stages, understanding the values (what they mean, how to convert them, etc), the importance of good test kits, etc.
- **When Should I Test For It?**
How to know which test(s) to do, when to test, and how frequently you should test.

TEMPERATURE

➤ **What is it?**

How hot or cold the water is.

➤ **Why's it Important?**

Without going into too much detail, temperature affects the metabolism of every organism in the tank, which in turn affects their biological systems (respiratory, sexual, etc).

➤ **What Value should I Aim For?**

There are many different ranges various hobbyists stick to, and pretty good reasons for each. A lot depends on what critter(s) you are keeping, and how you want them to react.

25°C (77°F) - 29°C (84.2°F)

TEMPERATURE

While there are many arguments over which temperatures are best, some tidbits you can use to make up your mind are:

- The less fluctuation in temperature, the better. A $\pm 2^\circ$ swing in 2 hours at most, is ideal.
- The higher the temperature, the faster every critters metabolism will be. This means it POTENTIALLY could fight off infections faster but it could also shorten the critters life span. Each critter can react differently.
- Ich and other parasites are rumored to thrive more in lower temperatures and tend to fade faster in higher temperatures (more than likely because of #2 above).
- Different critters do better at different temperatures. Research them.

TEMPERATURE

➤ **What Do the Values mean?**

Pretty straight forward answer, it means the temperature of the tank's water in either Celsius or Farenheight degree's. Your tanks either right where it should be, or it's hotter/colder than it should be. Adjust accordingly. Note that gradual changes/corrections are recommended.

➤ **When Should I Test For It?**

It really should be checked constantly. Every time you look at, walk by, or are near the tank, you should glance at the temperature.

There are many different devices to test for temperature. There are thermal stickers you can put on the side of the tank. Floating thermometers that either float in the tank, or can be suction cupped to the side. There are even electronic probes that constantly give an accurate digital temperature reading

SALINITY

➤ **What is it?**

Simply put, it's a test for how much salt is in the water. More scientifically, it's the concentration of sodium chloride in the water.

➤ **Why's it Important?**

With salinity (like temperature), while it's important to be in the right range, it's more important to maintain as close to a constant value as possible. Salinity's importance in your system, without going into a lot of scientific detail, is related to osmosis and each critter's ability to regulate ions.

➤ **What Value should I Aim For?**

The salinity in the natural reefs can vary from region to region. But the most common value found is about 35ppt (1.026 sg).

1.023sg (33ppt) – 1.026 (35ppt)

SALINITY

➤ **What Do the Values mean?**

The 35 ppt value simply means 35 parts per thousand. If you broke down the water into all it's parts, out of a thousand of those parts, 35 would be salt (sodium chloride). Another way to think of it is simply 3.5%.

The 1.026 sg value is a little trickier. The sg stands for Specific Gravity. Specific gravity is not so much a measure in units, as it is a measure of density as compared against pure water. Pure water has a Specific Gravity (density) of 1.0. SG is a quick way to guesstimate the salt content of your water. It is not always the most accurate way, however.

➤ **When Should I Test For It?**

This depends on the automation of your system. But early on, it's probably best to test more frequently.

SALINITY

Other scenario that it is advisable to test for your salinity

- Anytime you haven't topped off for a while, for whatever reason. Prior to topping off, you should know what your salinity is at. If it's at an extreme, you need to bring it back into range gradually, as opposed to just dumping several gallons of fresh top off water in. While most critters are better able to deal with a sudden decrease in salinity, than an increase, it's still highly recommended to make any drastic correction, slowly.
- If there's been a leak. Slow leaks could have let you top off day to day, and while saltwater was leaking out, fresh water was being added in. This can lower the salinity. If it's been a while, you again may need to bring it up gradually by topping off with a little saltwater.
- Anytime you dose anything significant. If you're adding calcium / alkalinity additives, you should test your salinity more frequently at first. Until you're more familiar with the affects these additives have on your tank, you should keep an eye on your other levels (like salinity) as well.
- Anytime you're adding new additions (fish, inverts, corals). You should test your tank's water as WELL as the water your critter came in. If the difference is significant, you should extend your acclimation time.

pH

➤ **What is it?**

The pH value is a measurement of how acidic or base (opposite of acidic) the solution being tested is. Specifically, this is in comparison to pure water (H₂O), which is neutral, and has a pH of 7.0 (at ~25° C).

➤ **Why's it Important?**

This parameter is a little trickier to explain, without getting scientific. pH is often misunderstood, but is actually an extremely important parameter in salt water tanks, as it affects a lot of different chemical reactions/factors in the tank, and ultimately every critter in it.

➤ **What Value should I Aim For?**

Generally, anything from 7.9 to 8.4 is tolerable. Yet once again, the more important thing here is consistency. 8.1-8.3 is ideal, but many people have successful reefs that have an average pH of 7.9-8.0 or even lower.

7.8 – 8.5 OK; 8.1 – 8.3 IDEAL

pH

➤ **What Do the Values mean?**

As stated, pH is the measurement of how acidic or base a solution is, relative to pure water. pH values greater than 7 mean that the solution is more base than pure water, while pH values lower than 7 mean that it's more acidic than water. The farther away from neutral (ph of 7) the value is, the more acidic or base that solution is.

➤ **When Should I Test For It?**

Most of the time, during normal tank operation. It's not a single test result that's valuable. Instead, what's important is the range of the tank's pH (over the course of the day) that's important.

pH

The pH of Some Common Solutions	
Hydrochloric Acid (Muriatic Acid)	-1.0
Vinegar	2.9
Milk	6.5
PURE WATER (H ₂ O)	7.0
Seawater	7.7 - 8.3
Bleach	12.5
Lye	13.5

AMMONIA

➤ **What is it?**

Chemically, it's NH_3 . Basically, it's the amount of fresh wastes in your system. Wastes like excess food, fish poop, dead critters, etc go through various stages as they break down. Ammonia is a main chemical created during the first stages of waste breakdown.

➤ **Why's it Important?**

Ammonia is very toxic to most animals that we try and keep (fish, inverts, corals, etc). Ammonia is toxic to pretty much anything but certain bacteria. With fish, for example, ammonia in the water will actually burn the fish's gills and eventually result in death.

➤ **What Value should I Aim For?**

0 ppm at all times

0 ppm

AMMONIA

➤ **What Do the Values mean?**

The test's value will tell you how much detectable ammonia is contained in the water. The values for ammonia are commonly given as ppm which means parts per million

➤ **When Should I Test For It?**

-Ammonia should be tested for during the tank's initial cycle or whenever there's been a problem with the tank.

Testing daily is good practice, and gives beginners something to do, while helping them get familiar with the testing process, but it is not necessary.

-Anytime a critter has died.

-When there is unusual large overfeeding.

-Other than the above mentioned situations, the decision to test for ammonia is entirely the hobbyist's decision, and rarely needed

NITRITES

➤ **What is it?**

Simplest way to explain this one is, there are bacteria that process (consume) ammonia. During this process, those bacteria give off/create nitrites. It is (for the purposes of the marine hobbyist), the 2nd stage of waste breakdown. Nitrites are also toxic to most marine life. Chemically, it's described as NO_2^-

➤ **Why's it Important?**

Nitrites affect your system in much the same way Ammonia does. It's a different chemical, but the affects are still the same. It's poisonous to the critters in the tank. Nitrites are the by product of the bacteria that are consuming/processing the Ammonia

➤ **What Value should I Aim For?**

The goal is 0 detectable nitrites. Any more than 0 readable nitrites can be toxic.

0ppm

NITRITES

➤ **What Do the Values mean?**

The test's value will tell you how much detectable nitrite is contained in the water. The values for nitrite are commonly given as ppm which means parts per million

➤ **When Should I Test For It?**

Only during the initial cycle of the tank, and possibly anytime there's been an ammonia spike in an established tank. Even then, nitrite levels only satisfy curiosity. Without a series of ammonia, and nitrate test results, nitrite test results alone tell us very little.

NITRATES

➤ **What is it?**

Easiest to think of as the 3rd stage of waste breakdown. Again, there are bacteria that process (consume) nitrites. During this process, those bacteria give off/create nitrates.

➤ **Why's it Important?**

It's a similar concept as with ammonia and nitrites, but a different chemical. The bacteria that consume nitrites produce nitrates as a by-product. The affect of nitrates though, on most inhabitants is less severe, and at small enough concentrations it can be harmless.

➤ **What Value should I Aim For?**

Ideally, you want 0 detectable nitrates. However...most critters can handle anything under 20ppm, fish especially. Corals however can be touchier. Some corals like softies and most LPS can not only deal with 20ppm or less

0-10ppm

NITRATES

➤ **What Do the Values mean?**

The test's value will tell you how much detectable nitrate is contained in the water. The values for nitrate are commonly given as ppm which means parts per million

➤ **When Should I Test For It?**

Until you are more advance, and really have your tank's husbandry mastered, Nitrates should be tested very frequently. Towards the end of a new tank's cycle, testing daily is not a bad idea. No critter should be added until nitrates are below 20ppm for at least 3 or 4 consecutive days after you get 0 ammonia and 0 nitrite levels.

ALKALINITY

➤ **What is it?**

Scientifically, alkalinity is a measure of the acid neutralizing capacity of a solution.

➤ **Why's it Important?**

Alkalinity's affect on the tank is a big one, but is rather indirect. So indirectly, if your alkalinity is off, then all the affects that pH has on the system come in to play. Bad alkalinity can allow rapidly shifting pH values which in turn will cause bad chemical reactions to take place in the tank

➤ **What Value should I Aim For?**

Anything from 2.86-4.29 meq/L (8-12 dKh) is acceptable. Actually there is no exact target you should shoot for, until you get more advanced. For the most part, as long as you're in that range, you are providing a good environment for your tank's critters.

2.86 – 4.29 meq/L (8-12 dKh)

ALKALINITY

➤ **What Do the Values mean?**

mEq/L - means milli-Equivalents per liter.

dKh - means degrees of Carbonate hardness, and is simply 2.8 times the mEq/L value.

➤ **When Should I Test For It?**

Whenever your having problems with or trying to maintain your tank's pH, Alkalinity, or Calcium levels.

CALCIUM

➤ **What is it?**

It's the amount of calcium (Ca) in the water

➤ **Why's it Important?**

Calcium itself, is used by the animals in the tank mainly to expand their skeletons (i.e. grow). Calcium is also inversely tied into alkalinity. If calcium levels drop, alkalinity will normally rise, and vice versa. Balance of the two is the goal.

➤ **What Value should I Aim For?**

Anything in the range of 380-480 ppm is good. Again, until you get more advanced (especially when trying to maintain SPS corals), any Calcium value in that range is acceptable.

380-480 ppm

CALCIUM

➤ **What Do the Values mean?**

The test values are usually in mg/L or ppm, which are interchangeable.

mg/L - means milligrams per liter

ppm - means parts per million

Both are equal units of measure and they both mean how much calcium is contained in the solution.

➤ **When Should I Test For It?**

Testing Alkalinity or Calcium levels alone don't do much good. Both must be tested together to get a good picture of what's going on. Therefore, the answer here is the same as with Alkalinity.

Whenever your having problems with or trying to maintain your tank's pH, Alkalinity, or Calcium levels.

MAGNESIUM

➤ **What is it?**

The amount of magnesium (Mg) in the water.

➤ **Why's it Important?**

Think of Magnesium as a Calcium wanna-be. During calcification, occasionally, Magnesium can be chemically substituted for Calcium. This means higher Magnesium levels can allow more calcification (a.k.a. growth) to occur.

➤ **What Value should I Aim For?**

Anything from 1250-1350 ppm is a good goal for Magnesium levels. The BEST value for you Magnesium is roughly 3 times the amount of Calcium in your tank's water.

1250-1350 ppm

MAGNESIUM

➤ **What Do the Values mean?**

The values tell you the quantity of Magnesium in the water in parts per million. This means, if you broke down the water into a million pieces, how many of them would contain magnesium.

➤ **When Should I Test For It?**

This is mainly an advanced test requirement. However, if you are dosing your tank with Kalkwasser, testing for Magnesium levels once every week or two isn't a bad idea. Kalkwasser helps maintain Alkalinity and Calcium levels, but one side effect is that Kalk use can cause slowly depleted Magnesium levels in the water column. Frequent water changes can compensate for this though.

PHOSPHATES

➤ **What is it?**

A measure of how much Phosphate (PO₄) is in the water

➤ **Why's it Important?**

Phosphates are fuel for algae. High phosphate values will end up meaning large algae growth. High phosphate content also can impede calcification (skeleton building). Phosphates do not really affect fish and inverts, and are mainly of concern when having problems controlling algae, or getting good coral growth.

➤ **What Value should I Aim For?**

Phosphate values as close to zero as possible are ideal. The problem is, most commonly available test kits out there don't do a really good job of testing true phosphate levels in the tank.

<0.02 ppm

PHOSPHATES

➤ **What Do the Values mean?**

The test values are usually in mg/L or ppm, which are interchangeable.

mg/L - means milligrams per liter

ppm - means parts per million

Both are equal units of measure and they both mean how much phosphate is contained in the solution.

➤ **When Should I Test For It?**

When fighting algae outbreaks and also when experiencing unexplained sudden coral bleaching/recession/death.

IODINE

➤ **What is it?**

Iodine is a general term and actually is comprised of many types and parts [iodide(I), iodate(IO₃), organic, inorganic, molecular iodine(I₂), hypoiodite, etc].

➤ **Why's it Important?**

Iodine is a trace element found as a very small percentage of Seawater. It is used and produced by a variety of critters for a variety of reasons. It is still an area that is being researched constantly by marine biologists, and as a result, very little about iodine content in our tanks has been proven one way or the other.

➤ **What Value should I Aim For?**

Iodine is found in Ocean water at values around 0.06ppm. Trying to maintain this level manually is not recommended. Because it's a trace element, it is better to leave maintenance of this parameter up to your Salt mix and frequent water changes.

0.06 ppm

IODINE

- **What Do the Values mean?**

Iodine test results are frequently measured in ppm, or parts per million.

- **When Should I Test For It?**

You really shouldn't. Trying to maintain iodine levels in the tank is not recommended, and should be left to advanced hobbyists.

TDS

➤ **What is it?**

It's just a measure of how much organic AND inorganic content there is in the water. Or, in other words, how dirty (how much unwanted stuff) is dissolved in the water.

➤ **Why's it Important?**

TDS is a measurement that applies only to the freshwater you use for topping off and mixing new salt water. TDS is a measure of how dirty the water is. The dirtier the water, the more harmful it can be for the tank.

➤ **What Value should I Aim For?**

Since this is mainly a measurement used on the water you'll be using to mix new SW or to top off with, ideally, the closer you get to zero, the better for the tank.

0

TDS

- **What Do the Values mean?**

TDS is an estimated count of how many dissolved solids are present in a unit of water.

- **When Should I Test For It?**

If you have an RO/DI unit, depending on how much water you produce, you should test your output water every 30 or 40 gallons produced. Some units come with TDS meters that allow you to test constantly.

COPPER & OTHER T.E.

➤ **What is it?**

There are many other chemicals you can test your water for, each a measure of that chemical. Most are not important, other than that they remain trace (very minute amounts) elements in proper proportion. Some of these are Copper, Strontium, Iron, Silicates, Boron, etc.

➤ **Why's it Important?**

The importance of other trace elements is also an area that scientists are constantly studying and discovering. Most do serve a definite purpose, but they are contained in such small amounts that monitoring and maintaining these values are not recommended.

➤ **What Value should I Aim For?**

As previously stated, it is not recommended that the average aquarist monitor nor maintain these values. But for the sake of interest, I've included a few trace elements and the values typically found in natural sea water:

COPPER & OTHER T.E.

Chemical	Content
Boron	4 ppm
Copper	10-40 ppm
Iron	.005 ppb (parts per billion)
Strontium	< 10 ppm
Silica	anywhere from 2.7 to less than 0.06 ppm

END