

# Here are the 9 MOST IMPORTANT Reef Tank Parameters

Here are the 9 MOST IMPORTANT *Reef Tank Parameters*:

1. Alkalinity
2. Ammonia
3. Calcium
4. Nitrate
5. Nitrite
6. pH
7. Phosphate
8. Salinity
9. Temperature

Let's dive a little deeper into each individual water parameter as well as the value considered to be ideal for a reef tank:

## Alkalinity

Alkalinity is a complex concept/thing to contemplate. As aquarists, we don't care so much about the scientific definition of it, as much as we care that it is a proxy (a way to estimate) the amount of bicarbonate available in the water—because bicarbonate is essential for coral health—it is one of the main 'ingredients' used to build coral skeletons.

### *Ideal Alkalinity for a Reef Tank*

The ideal alkalinity for a reef tank is 8-12 dkh. That's a pretty broad range. The goal, as with most of these water parameters, is to maintain consistency. Even though the accepted range is 8-12 dkh, it doesn't mean your tank will do well if the alkalinity drifts dramatically from day to day. Do what you can to

maintain a stable alkalinity—and even if you are trying to get your alkalinity up (if it is low, for example), you will want to do so very, very gradually to avoid shocking any of the animals in your system.

## Ammonia

Ammonia is a toxic waste in your aquarium. Except for when you are cycling your tank, you want ammonia levels to be as close to zero as possible.

Ammonia gets into your reef tank when your fish...um...pee...and also when food or other stuff rots. A healthy, fully-functioning biological filter will remove ammonia from your water. If you have detectable levels of ammonia in your tank, it means your tank is too new (has not fully cycled yet) or there is a problem with your biological filter. Learn more about [cycling a fish tank here](#).

### *Ideal Ammonia Parameter for a Reef Tank*

The ideal ammonia level for a reef tank is ~0 ppm. If your tank has fully cycled, there should be no detectable levels of ammonia. Ammonia can burn your fish and corals and at higher levels, it can be toxic.

## Calcium

Calcium is another essential element for coral health in a saltwater aquarium. According to the Drs. Foster and Smith chart, natural coral reefs tend to have calcium levels between 380-420 ppm (parts per million). For simplicity sake, I find 400 ppm to be a suitable approximate value. Calcium is extremely important for [LPS Coral](#) and [SPS Coral](#).

### *Ideal reef tank parameter for Calcium*

The ideal reef aquarium water parameter for Calcium is ~400 ppm

## Nitrate

In a properly cycled aquarium, the presence of nitrate is confirmation that your biological filter is working. Congratulations on that. On an ongoing basis, you

want to strive for nitrate levels as low as possible. However levels around 30-40 ppm are generally tolerated by most saltwater aquarium fish (except for fragile species) and many soft corals that tend to come from nutrient rich waters.

## *Ideal reef aquarium value for Nitrate*

The ideal reef aquarium value for nitrates is ~0 ppm. However, as mentioned above, you may be able to 'get away with' slightly higher levels.

## Nitrite

Nitrite is an intermediate by-product produced by your bacterial filter. In your filter, bacteria convert toxic ammonia into less toxic nitrite and then nitrite is further converted into an even more safe chemical called nitrate. Except when cycling your tank, nitrite levels should remain as close to zero as possible.

## *Ideal Nitrite level for a reef tank*

~0 ppm

## pH

While the absolute pH is important, it is perhaps even more important to ensure that the pH remains stable. Dramatic swings in pH can cause problems for your live stock.

## *Ideal pH for a reef aquarium*

~8.1-8.4

## Phosphate

On natural reefs, phosphate is present at a level of ~0.13 ppm. In your saltwater aquarium, it acts as a fertilizer for algae—because of that, I recommend you keep levels below 0.2 ppm if possible.

## *Ideal phosphate level for a saltwater tank*

<0.2 ppm

## Salinity

The salinity of the ocean is actually ~ 35 g/L, but for your saltwater aquarium, it is more common to measure the specific gravity of the water as a proxy for salinity, because of how easily specific gravity can be measured. If your zoanthids have closed up, check your salinity.

## *Ideal salinity level—measured as specific gravity*

Ideally, you want to keep your reef tank at a specific gravity of 1.025

## Temperature

As long as the temperature of your saltwater aquarium is in this range, keeping the temperature consistent (avoiding fluctuation) becomes more important than the actual value itself. I have most commonly seen/heard recommended temperatures around 78 degrees Fahrenheit (25.5 degrees Celsius).

## *Ideal Value*

73-84 Fahrenheit or 32-29 Celsius

## Other important water parameters (not in the Top 9)

There are three other aquarium water parameters on the Drs. Foster and Smith chart that I left off of my list of the 9 MOST IMPORTANT reef tank parameters:

- iodine
- magnesium
- strontium

The reason those three reef tank parameters didn't make the cut is that they are *not practical* to measure or dose in a saltwater aquarium. Don't read this the wrong way—all three are important to reef coral biology. The critical factor is not that these are irrelevant biologically, but that they are not practical for the casual hobbyist. Magnesium is a tremendously important ion—but it is available in such large amounts in a typical aquarium that it is all but irrelevant for most aquariums. Iodine and Strontium, on the other hand, are important trace elements—but their concentrations are generally so low that it is not practical to dose them, measure them or otherwise deal with them in any reasonable fashion. As best I can tell, the science supporting the dosing of these trace elements in a reef aquarium is inconclusive. So, I took them off the list. No sense measuring something you don't intend to act upon.

## Iodine

Iodine, as a trace element does appear to be important to several macro algae, shrimp and coral species, but because natural levels are so low (0.06 ppm), it is very difficult to test and maintain these levels with standard test kits. As such, I don't recommend dosing iodine as a supplement with the intent to keep levels consistent with natural seawater.

### *Ideal Value*

0.06 ppm

## Magnesium

Magnesium is the third-most abundant ion in seawater. It is an extremely important ion, but since it is generally present in such high quantities,

measuring it and worrying about it just doesn't seem that practical to me. As such, I put it in the 'nice to know, but don't need to worry' bucket.

## *Ideal Value*

1285-1300 ppm

# Strontium

Strontium is actually a bit of a controversial supplement in the saltwater aquarium hobby (well, I guess as controversial as something like strontium supplementation could be). If you want to learn more about Strontium than most chemists (slight exaggeration there) check out this article. By the way, the author states that typical ocean levels of strontium are 8 ppm.

## *Ideal Value*

~8 ppm

So those are the 9 MOST IMPORTANT **reef tank aquarium water parameters** and 3 important aquarium water parameters that are just not worth your time and effort (in most cases). But now that you know what the most important water parameters are, what are you supposed to do about it?

# Testing your water

Now that you know which reef tank parameters are the most important to pay attention to, you should be sure to test your aquarium water to be sure your aquarium water is in a suitable range. The next several links to test kits are affiliate links that will take you to the Amazon.com product page for those products, where you can review the specifications more closely (if you wish) and read user reviews to decide for yourself. Just so you know, I do earn a tiny commission if you purchase anything on Amazon after you visit through one of those links. No pressure to do so, just letting you know those are affiliate links. To tackle the big four reef tank aquarium water tests (ammonia, nitrite, nitrate and pH), you may want to check out the [API Saltwater Master](#)

[Test Kit](#). Using this kit, you can test for the four big aquarium water parameters in just a few minutes.

You can find this kit in most of the major fish stores (including the big chains). I was surprised to see how expensive it was at retail [compared with online](#). This is the kit I used when I set up my first aquarium, and I have replaced it more than once. For alkalinity, phosphate and calcium, I have generally used individual test kits

- [API Calcium Test Kit](#)
- [API Phosphate Test Kit](#)
- [API KH Carbonate Hardness Test Kit](#)

## Equipment for Measuring Reef Tank Parameters

For [equipment](#), I now use this [Refractometer](#) to measure salinity. For temperature, I use this [Digital Aquarium Thermometer](#) that I bought, a while back, on Amazon. Now, a few thoughts here about reef tank aquarium water testing: no test kit, intended for hobby use, is going to be perfect. Test kits can sometimes get a bad reputation, or get blasted in online forums for their unreliability or lack of precision.

## Equipment for Maintaining Aquarium Water Parameters

High quality reef tank water starts by using a [high quality reef aquarium salt mix](#). To keep your water parameters in the ideal range, you may want to have a [protein skimmer](#), installed in a [sump](#) with a [refugium](#), a [calcium reactor](#) and reliable heaters and/or a [chiller](#).

## Troubleshooting

- Regardless of whether you spend \$7 on an API test or \$25 for a [Salifert](#) test kit, you need to take some measures to ensure your glassware is clean (and not contaminated) and that you perform the test according to the included instructions—and even then, treat each test as a single data point. If you don't keep clean glassware, you're not going to be able to rely on the reef tank parameters you get as readings from the test kits.
- If you suspect a problem with your reef tank parameters, there is no substitute for *observing* your reef tank and visually determining if the data point from your test kit is consistent with what your eyes see. Because test kits can, and do fail.
- If you get a really high nitrate reading but your tank is telling you otherwise...do a water change (just to be safe) but get another kit to verify it isn't a false reading. Also don't make the mistake of thinking that the hobby test you bought for a few dollars is as reliable as reagents or equipment that would cost an analytical lab a few hundred dollars. What's most important, when testing at home, is detecting changes in water parameters as they are happening, using that information to find the root cause and fixing it.
- At home test kits are not for writing your thesis paper or defending the absolute value of the water parameter in question. You could spend a whole lot more money on more expensive test kits if that suits you, your budget or your approach to testing. For me, close enough is good enough—and I'm comfortable knowing that there are so many other factors affecting the test results (like my own sloppiness, lack of technique, etc.) that a good-old mass-market test is good enough for me. But I encourage you to decide for yourself.

A big disclaimer that is appropriate for this entire article (a version of a similar disclaimer is also on the LiveAquaria website) is that what I've listed above are **general** reef tank parameters. It is entirely possible that specific individual species you acquire for your own tank may come from an environment that differs from these generalities and may therefore require specific care. It is up to you to research the husbandry needs of the animals you want to keep to be sure you know if their needs differ from the standard water parameters. And if your animals require specific aquarium water parameters—you should do your best to meet those standards—or steer clear of those animals.

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