



Chemistry

Essential to successful reef keeping is a basic understanding of marine water chemistry and faithful monitoring of tank water chemical parameters.

Salinity

Salinity is a measure of how much salt (NaCl - sodium chloride) is in the water. The salinity of natural sea water varies by ocean, sea and reef, but is usually near 1.022 specific gravity or "30 ppt. The two most common instruments to measure salinity are the refractometer and the hydrometer. Reef tank salinity should be maintained between 1.020 and 1.024 s.g. or 28 and 32 ppt.

pH

pH is a measure of the acidity (or basicity) of a solution. Solutions with a pH <7 can be called "acidic" with a pH >7 can be called "basic." The pH of natural sea water varies throughout different marine environments (different oceans and seas), but is basic to some degree or another. Reef tank pH should be maintained between 8.1 and 8.6. pH in a reef tank will fluctuate throughout the day (rising during the day and falling at night). pH test kits come in many styles and types. All will work.

Calcium

Reef tanks need calcium (not just for stony corals but for many soft corals and other reef critters too). Natural sea water has a calcium concentration of 410 to 420 ppm. Reef tank calcium should be maintained to at least 350 ppm (and at 410 to 420 ppm for tanks with faster growing stony corals). Calcium levels can be too high. High calcium levels bring down alkalinity. It's difficult to have a calcium concentration of 450 ppm or higher while also maintaining sufficiently high alkalinity. Imagine that calcium and alkalinity are on opposite ends of a teeter-totter. When one goes up, the other goes down (and vice versa). You can raise your calcium with additives, or with a **calcium reactor**.

Buffers & Alkalinity

Buffers help protect your aquarium water against sudden changes in pH. The ability of the buffer to prevent sudden changes in pH is called a "buffer capacity." As the term is usually used in the hobby, alkalinity can be thought of as one measure of the buffer capacity of our aquarium water. Chemical compounds called "bicarbonate" and "carbonate" are the major contributors to alkalinity. They're not the only contributors, but in our tanks, they're by far the most important. They're also what is usually tested for in alkalinity test kits. Reef tank alkalinity should be maintained between 2.5 and 4 meq/L or 7 and 11 dKH. It's important to note that while alkalinity can *help* your tank resist changes in pH, buffers can be "broken" if pH rises or falls too much too quickly. Therefore it remains important to monitor pH so that it does not fall too far out of acceptable range. The most common way to raise alkalinity is with a buffering additive or a **calcium reactor**.

Adjusting Water Chemistry

Go gradual: Don't try to correct an alkalinity level of 1 meq/L or a calcium level of 380 ppm overnight. Alkalinity should not be raised or lowered any faster than 1 meq/L per day and calcium adjusted no more quickly than +/-40 ppm per day. Raising your alkalinity too fast could cause your calcium to plummet too quickly (and vice versa). Whenever you're adjusting alkalinity or calcium, be sure to monitor the other as well.

Test diligently: Always test the water before and after you act so that you know what you need to do next (if anything).

Observe: Pay attention to any patterns in your water chemistry. For example before fretting over high or low pH, take the time to measure your pH several times over the course of a day or two (test it in the morning, afternoon and night-- before the light comes on, while it's on and after it's off). It is normal for pH to swing in a range as wide as 8.0 to 8.6 over the course of a day (peaking at "noon" and falling at night).

Calcium Reactors

Calcium Reactors offer a simple and convenient solution for maintaining calcium and alkalinity in your reef tank. After the initial setup, the calcium reactor requires minimal maintenance. A calcium reactor is almost a necessity for tanks heavily stocked with stony coral where calcium and alkalinity demands are high.

It is also a great addition for those looking to boost the growth of coralline algae on their live rock. Calcium reactors provide a steady supply of calcium by using CO₂ to dissolve media in the reactor and, thus, releasing calcium into your water. The effluent released also acts as a buffer to stabilize pH. The media also contains the required trace elements and minerals (accept iodine), which are released into the aquarium as the media dissolves.



Octopus Calcium Reactor