

WHAT IS MARINE KH PLUS?

MARINE KH PLUS is a concentrated solution created in our Research and Development laboratory to increase carbonate hardness in reef marine aquariums, essential for the growth of LPS and SPS corals. The carbonate hardness stabilises the pH value in aquariums and helps the correct absorption of calcium and magnesium.

The ideal value of KH is between 8-10° dKH.

The carbonate hardness, together with calcium and magnesium is one of the basic elements for the correct maintenance of your corals.

MARINE KH PLUS contains 95,000 mg/L of CaCO₃.



OVERVIEW

To maintain a healthy reef aquarium, it is first necessary to properly maintain the water parameters, which provide a healthy and stable environment for your corals and invertebrates.

Of all the elements present in sea water, a number of them in particular play a role of fundamental importance and include: carbonates, calcium and magnesium.

The correct balance between these three elements has an important effect on the biological processes of the coral and on the chemistry of the water.

MARINE KH PLUS is a liquid source of bicarbonates. The formulation has been designed to be perfectly assimilable and soluble in water.

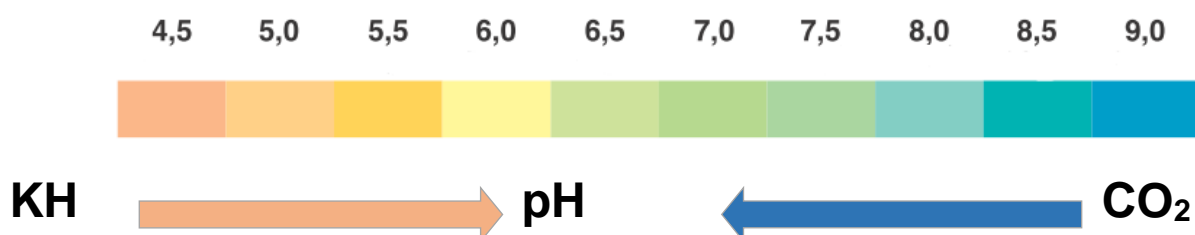
The KH is the measure of the alkalinity of the water produced by the presence of carbonates CO₃²⁻ and HCO₃⁻.

A correct alkalinity value of the water helps to keep the pH stable and to correctly absorb the calcium and magnesium.

→ There is a specific correlation between pH, CO₂ and KH:

CO₂ and KH are the extremes that affect the pH value as CO₂ increases. If the KH is low, the equilibrium shifts to the left, resulting in a lowering of the pH.

Conversely if the CO₂ is weak and the KH high, the equilibrium shifts to the right, resulting in a rise in pH.



Similarly in the aquarium if the presence of CO₂ is too high and the KH value is lower than the recommended limits for the aquarium, the pH will tend to acidify. If, instead, the KH value is correct with respect to the limits recommended for the aquarium, the pH will remain balanced, maintaining the correct value necessary.

The growth of the coral skeleton is influenced by KH as it is involved in the transition from bicarbonates to carbonates. This KH dissolution power automatically helps to balance the quantities of calcium and magnesium that can be dissolved in water and which therefore become available for corals.

To raise the level of calcium to facilitate the growth of corals, we must inevitably raise the KH; in this way the calcium and carbonate ions meet in solution and stabilise each other, without creating precipitations.

As with calcium and magnesium, KH is essential for healthy coral growth and formation as it is itself an integral part of the coral skeleton and is involved in the transition from soluble compounds (bicarbonates) to insoluble compounds (carbonates).

HOW IT WORKS

The buffering action of KH is represented by this reaction:



CO₂ = carbon dioxide

H₂O = water

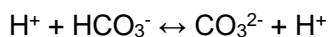
H₂CO₃ = carbonic acid

H⁺ = hydrogen ion (cation)

HCO₃⁻ = bicarbonate ions

The presence of a correct value of KH helps to keep the reaction balanced, obtaining carbonic acid.

In turn, the bicarbonate and hydrogen ions, in the presence of high quantities of carbonic acid, further dissociate into carbonate ions and hydrogen ions according to the following reaction:

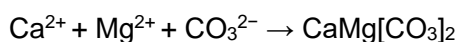


H⁺ = hydrogen ion (cation)

HCO₃⁻ = bicarbonate ion (anion)

CO₃²⁻ = carbonate ion (anion)

The high presence of carbonate in water is essential for the correct bond with calcium and magnesium, as represented by the following reaction (precipitation reaction):



CO₃²⁻ = Carbonate ion

Ca²⁺ = calcium ions (cation)

Mg²⁺ = magnesium ion (cation)

CaMg[CO₃]₂ = double carbonate of magnesium and calcium

MARINE KH PLUS, thanks to its formulation, prevents us having to alter the balance of the aquarium and guarantees the health of your inhabitants; it is perfectly assimilable, miscible and ready to use.

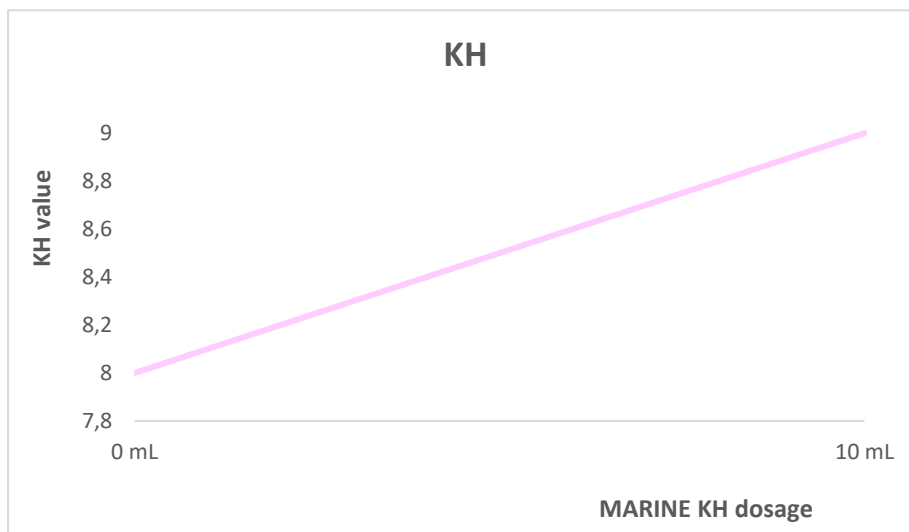
A healthy reef aquarium depends on the correct and appropriate maintaining of water parameters which in turn provide a stable environment, essential for corals.

10 mL of *MARINE KH PLUS* increases in 50L of water 1° dKH.

TESTS PERFORMED

The test was carried out in a 50 Lt marine aquarium with biological filter consisting of *FILTERWATTE + BIOCLARO + CRYSTALCIL*, *MAGIC PUMP 350* pump and the water was made with *OCEAN FISH*; the aquarium did not contain fish and corals to demonstrate how *MARINE KH PLUS* brings about an actual increase in the value of the carbonate hardness which, if necessary, will bring the level to a correct equilibrium.

We measured the KH value with *PRODAC TEST KH* in the aquarium and then we administered 10 mL of *MARINE KH PLUS* as per the instructions. Then we measured the resulting KH value in the aquarium again and plotted the resulting values with this graph.



With this test it can be seen how with 10 mL of *MARINE KH PLUS* in 50 Lt we raised the KH value in the aquarium by 1° dKH.

DISCUSSION

MARINE KH PLUS is perfectly soluble in water. It immediately makes available an increase in KH in case the correct development of invertebrates is required and keeps your marine aquarium healthy. Moreover it is free from nitrates and phosphates.

MARINE KH PLUS is part of the *PRODAC* line of trace elements, essential products for the correct maintaining of your marine aquariums.