

KH/GH Fresh Test

Instructions for General Hardness (GH) & Carbonate Hardness (KH) test

GB *Hardness Test*

Introduction to Water Hardness

Dissolved Calcium and Magnesium salts cause water hardness. This natural property of water is demonstrated by the fact that soft tap water foams much easier when soap is added, than hard water.

Calcium and Magnesium salts of Sulfate, Nitrate and Chloride are highly soluble and are therefore relatively stable components of water hardness. The amount in which these salts are present is called the permanent hardness, which is part of the General Hardness or GH. The remaining part of the GH consists of salts that have a low solubility and are therefore an unstable component of the GH. The hardness caused by this unstable part of the GH is sometimes referred to as temporary hardness. More common however is the term Carbonate Hardness or KH, since the salts involved are Carbonates of Magnesium and of Calcium.

Magnesium and Calcium Carbonate have a very low solubility. Only when free CO₂ is present can these salts dissolve in significant amounts as bicarbonates. When the CO₂ is removed, however, a precipitate of Calcium and Magnesium carbonate will be formed and the KH will decrease. Precipitation will occur for example when water is boiled which drives out CO₂ or as a result of plant growth, which also removes CO₂ from water. Precipitation only lowers the KH, the permanent hardness will remain stable.

Test kits for water hardness measure the GH and the KH. The permanent hardness can easily be calculated out of both values as follows: Permanent Hardness = GH-KH. GH, KH and permanent hardness are all significant parameters: for example, two water samples with an identical GH can be of entirely different composition, which will become clear when the KH is measured.

Hardness for fish

The water hardness is important for the well being of many fish species. The GH and KH of natural fresh water around the world varies considerably: from very soft South American jungle streams to hard African lakes. Many fish are quite flexible in their preference of water hardness in the aquarium, especially when they have been bred in captivity. It is however recommended to consult a reference book for the natural preference of the fish, especially when one intends to breed this species. Also, the fish dealer can give important information, for example whether it concerns tank raised or wild caught fishes. Fish species that have been bred in captivity for several generations may have lost their narrow adaptation to a specific water hardness.

Hardness for Plants

For water plants both the GH and the KH are important. The GH should be contained at soft to middle hard values (see table). The KH influences the maximum amount of dissolved CO₂, which is an essential nutrient for plants. A CO₂ test kit is available in the Red Sea "Plant Lab" or "Fresh Lab Deluxe" Kits.

General Hardness is classified as follows:

Hardness ° GH	Classification
0 - 4	Very soft
4 - 8	Soft
8 - 12	Medium hard
12 - 18	Hard
18 - 30	Very hard
> 30	Extremely hard

Directions-GH/KH Test

1. Use GH or KH indicator and color card according to which test is to be performed.
 2. Clean a test tube by rinsing it with water to be tested.
 3. Fill the test tube to the 6 ml mark with water to be tested.
 4. Add 1 drop of Indicator, close the test tube with the stopper and shake gently for 10 seconds. The original color of the liquid should correspond to the starting color of the applicable color scale.
- Note: should you obtain the end color, your sample contains extremely soft water (less than 1° GH or KH).
5. Open the test tube, add one drop of Indicator and shake gently. Compare the color of the sample in the test tube with the corresponding end color on the relevant color scale.
 6. Repeat direction 5, adding one drop at a time until, the end color is achieved, counting the number of drops added.
 7. Clean the test tube and stopper with tap water.
 8. Number of drops = degrees GH or KH as appropriate.

Interpretation of results

Most fishes and aquarium plants prefer soft to medium hard water. The optimum KH for water plants is 3-8° KH. For specific requirements of fish or plants you should refer to aquarium literature.

Hard water is softened simply by mixing it with reverse osmosis water until the required hardness is obtained. Soft water is hardened by adding Calcium Sulfate, which increases the permanent hardness (thus the GH, but not the KH). The KH is increase by filtration over Calcium Carbonate or by adding bicarbonate. Proprietary water softeners or hardeners are available in aquarium shops.

Safety Warnings



KH Indicator -
Contains Ethylene-glycol.
Harmful if swallowed.
Keep locked up and out of the reach of children.

Harmful

GH Indicator - Contains Triethanolamine.
Keep out of the reach of children.

Made in Israel by
Red Sea Fish Pharm Ltd.
Free Trade Industrial Zone,
P.O. Box 4045, Eilat 88000

Red Sea Europe
ZA de la St-Denis, F-27130
Verneuil s/Avre, France.
Tel: (33) 2 32 37 71 37

Red Sea U.S.A.
18125 Ammi Trail, Houston,
Texas 77060
Tel: 1-888-RED-SEA9

Red Sea Germany
Hauptstrasse 37, 40699 Erkrath
Tel: (49) 2104 175888

Red Sea