

## eSHa AQUA-QUICK-TEST

MULTI-TEST (6 VALUES) FOR AN ECONOMICAL, PRACTICAL AND SIMPLE TEST OF WATER QUALITY

### Healthy water = healthy plants and healthy fish.

Good water quality is essential for the plants and fish in your aquarium or pond.

With the eSHa AQUA-QUICK-TEST you can monitor five values which are crucial for good water quality: pH (acidity), KH (carbonate hardness), GH (general hardness), nitrite (NO<sub>2</sub>) and nitrate (NO<sub>3</sub>).

It's important for you to understand what can cause abnormal values and what action you can take if the test strip indicates that the water quality is not good.



### Water quality is the result of many factors.

The most important factors are: plants, fish, aquarium volume, pond size and depth, bottom layer of sediment etc. as well as external factors such as overfeeding, type of water added, the filter used, acid rain, duration and amount of lighting, sunlight etc.

Rarely is there a stable and completely natural balanced system. Aquaria and ponds are set up by people whom also choose the plants and fish. The system has not developed naturally and spontaneously. Some plants and fish are very adaptable. Others are more sensitive to their environment and need very stable and optimal water quality. Therefore, you sometimes need to give your aquarium or pond a helping hand.

### A test in time saves nine.

Regular use of eSHa AQUA-QUICK-TEST allows you to spot water quality problems in time to take corrective action when needed.

This is your best guarantee for having a beautiful aquarium or pond full of healthy active fish and thriving plants and, most importantly, keeping it this way.

Get more pleasure out of your aquarium or pond and save yourself worry, frustration and even despair.

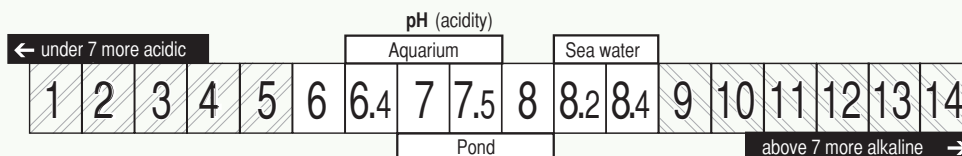
### The key parameters for aquaria and ponds are:

acidity (pH), hardness (KH and GH), and products of decomposition (NO<sub>2</sub> and NO<sub>3</sub>).

These values determine how healthy your aquarium is. Abnormal values can cause problems such as disease, algae blooms, abnormal growth and reproduction etc.

### Acidity or pH of the water

pH is measured on a scale of 0 to 14. A value of 7 is neutral. If the pH is lower than 7, then the water is acidic. If the pH is higher than 7, the water is alkaline. The pH in aquaria and ponds normally fluctuates during the day/night cycle. These changes in pH are caused by changes in CO<sub>2</sub> (carbon dioxide) concentration (due to plant growth). During daylight hours the pH rises only to fall back to its original value during the night.



The pH is very important for all living organisms in aquaria and ponds. It's importance is increased even more due to the way pH influences and interacts with other factors. For example:

- the KH determines how easily the pH can change. A low level of KH allows the pH to fluctuate more quickly and over a wider range.
- higher pH values cause harmless ammonium (NH<sub>4</sub><sup>+</sup>) to change into harmful ammonia (NH<sub>3</sub>).
- If your pH is over 7.8 check your ammonia levels regularly using an ammonia test kit. Adjusting

the pH should always be done gradually; a quick increase or decrease is harmful.  
Favourable pH value for household aquaria: 6.8 to 7.5.  
Favourable pH value for ponds: 7.0 to 8.0.

### Adjusting the pH:

Lower the pH with peat products, soft water or a pH-reducer. Raise the pH by adding hard water or a KH-raiser. Acid forming or alkaline materials should be removed if present.

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### Measurement:

Compare the colour of the test strip with the reference colour chart. If the colour of the test strip is in between two reference colours, the pH value is also intermediate.

A test colour between 7.2 and 7.6 indicates a pH of 7.4 (higher or lower depending on colour intensity).



### pH inaccuracies in low KH conditions:

The accuracy of the pH test can be affected in low

KH conditions (low buffering capacity). This is because the levels of pH determining components (acid and alkaline) are not present in sufficient quantities for the pH test to register accurately. If KH registers at 4°dH or lower the pH test may not be accurate. However, all the other tests on the strip remain accurate.

Low KH can result in major pH fluctuations which can be life threatening for aquarium fish. Therefore, a KH of 4°dH or higher is recommended. Tap water of 4°dH or lower is uncommon in most areas.

### Water Hardness

For aquaria and ponds both general hardness and carbonate hardness are important. From a biological point of view, general hardness is the most important.

Within certain limits, fish and plants can adapt to changes in GH. Carbonate hardness (KH) is very important biochemically; it has a direct influence on pH and CO<sub>2</sub>.

### GH-General Hardness

GH is the sum of all the substances dissolved in water which determine the hardness or softness of the water.

(These are salts of calcium and magnesium such as sulfates, carbonates, chlorides etc.).

GH is what is meant when fish or plants are said to prefer hard or soft water. The reason for this is that GH influences cell membranes, kidney function, growth, transport of essential salts, incorporation of minerals and trace elements, osmotic pressure, etc.

Be careful with materials (such as decorative rocks) which release calcium and magnesium salts into the water. They make the water hard and keep it that way. Adding a lot of tap water or rain water or replacing part of the water often changes the GH value.

Favourable values in household aquaria are 6° to 12° GH and in garden ponds 7° to 14° GH.

If too low → add hard water or a KH-raiser

If too high → dilute with soft water, use ion exchange filter or adsorption filter

### Measurement:

- none of the GH test squares are purple: GH lower than 6
- one of three GH test squares purple: GH more than 7
- two of three GH test squares purple: GH more than 14
- three of three GH test squares purple: GH more than 21

*A test square that is partially coloured indicates an intermediate value.*

One fully coloured square plus a second square that is faintly or partially coloured indicates a GH of about 10. Also see conversion table.



### KH-Carbonate Hardness (Buffering Capacity)

KH contributes to the general hardness of water and is made up of salts of carbonate and bicarbonate. Because of its ability to bind acids in water, KH is responsible for the buffering capacity of water with respect to acids.

Important: KH has a direct influence on the acidity (pH) and on the carbon dioxide (CO<sub>2</sub>) concentration which is also important for plants.

The KH level tends to decrease with time due to biological processes which remove calcium carbonate from the water.

If the KH level falls to 4° KH or lower, the plant and animal community in the aquarium will begin to suffer. Too little KH leads to erratic and unstable pH values which is harmful.

Tip: In newly established ponds the KH value is often too low.

Good (buffer) values for household aquaria are 4° to 10° KH and in ponds 6° to 12° KH.

KH values which are too low or too high can cause problems with plants and fish.

If KH is too low → add hard water or a KH-raiser.

If KH is too high → add soft water, filter over peat or other products which lower KH.

### Measurement:

Compare the colour of the KH test square with the reference colour chart on the tube.

An intermediate colour in a test square indicates an intermediate value.

A colour between 10 and 15 for example means a KH value of 12 to 13. Also see the conversion table. (*less or more depending on the colour intensity*).



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### Recycling of Waste Products or Biological Stability

In nature, biological waste products of fishes and plants including dead plant fragments and food remains are broken down and recycled. Basically it's like a compost heap in which micro-organisms break down waste products. The compost which is the end result can again be used as a nutrient for plants.

In the aquarium, waste products and their various intermediates are first converted into nitrite which is finally converted into nitrate. This conversion is carried out by various kinds of micro-organisms.

The level of nitrite and nitrate tells us something about the level of bacterial activity.

They tell us whether the various steps in the biological cycle are working properly, and as a result whether you will have a well balanced aquarium or pond in which plants and fish grow well.

#### NO<sub>2</sub>-Nitrite

Nitrite is produced when certain micro-organisms (nitrifying bacteria) break down waste products produced by fish, food remains, etc. Nitrite is toxic for fish. Other kinds of bacteria are able to convert nitrite, or NO<sub>2</sub>, into the much less harmful nitrate, or NO<sub>3</sub>. By measuring the level of NO<sub>2</sub> we can actually check to see if there are enough 'good bacteria' present to convert the NO<sub>2</sub> into NO<sub>3</sub> just as quickly as the NO<sub>2</sub> is formed.

These good bacteria are mostly found in the filter and substrate and are sensitive to changes in acidity (pH and carbonate hardness!) and low oxygen levels (pumps, filters!) and especially sensitive to antibiotics and toxic substances. A high NO<sub>2</sub> level means that the bacterial community is not functioning well.

NO<sub>2</sub> is less harmful in harder water (high values of GH and KH).

Favourable NO<sub>2</sub> level is less than 0.3 mg/l.

If NO<sub>2</sub> level is too high, quickly change the water. After changing water, again measure NO<sub>2</sub>. Try to discover the cause and add nitrifying bacteria if possible. Nitrifying bacteria reproduce, grow and recover slowly.

Causes of high NO<sub>2</sub> levels:

- too much waste material present,
- overfeeding,
- dead fish,
- not enough nitrifying bacteria,
- death of nitrifying bacteria,
- sudden changes in pH ( → check KH),
- antibiotics,
- unsuitable filter or filter material,
- not enough oxygen in water ( → check pumps),
- newly installed aquarium or pond.

#### Measurement:

Compare the colour of the NO<sub>2</sub> test square with the reference colour chart.

*A pink colouring of the test square means that NO<sub>2</sub> is too high. Depending on the water's own natural colour, this indicates a value of 0.3 to 0.5 mg/l. If the colour is more intense than 0.5 mg/l, action should be taken.*



#### NO<sub>3</sub>-Nitrate

The last step in the process of breaking down waste products. In nature, this marks the last step in the cycle. Because the micro-organisms have done their useful work, the end product, nitrate, can now be utilized by plants. Within certain limits nitrate is not harmful to fish and is an excellent nutrient for (terrestrial) plants.

#### Aquatic plants use nitrate only in small amounts, however, algae thrive on it.

Usually, in aquaria and ponds, more nitrate is produced than can be taken up by (water) plants. The simplest solution is to regularly replace the water before the nitrate level rises too much:

In aquaria: replace a minimum of 20 to 25 % per month.

In ponds: at temperatures above 15 °C, 10 to 20 % per month.

**Favourable levels: preferably under 25 mg/l (to limit algal growth).** For fish, levels between 50 and 100 mg/l are acceptable. At higher levels problems will occur in the long term. The best remedy is regularly replacing the water.

(Tap water often contains high levels of nitrate. Test your tap water regularly for nitrate. The nitrate level can vary quite a bit from day to day, depending upon which pumping station is supplying your area with tap water).

Causes of high levels include: too many fish, not enough plants or unhealthy plants, not changing water often enough, poor conditions for nitrifying bacteria (if levels too high replace water), more plants, less fish, do not overfeed, filter over materials which adsorb nitrate.

**Measurement: Compare the colour of the test square with the reference colour chart. An intermediate colour on an NO<sub>3</sub> test square indicates an intermediate value.**

*A colour between 10 and 25 means that NO<sub>3</sub> is around 20 mg/l (less or more depending upon colour intensity).*



## eSHa AQUA-QUICK-TEST

### Cl<sub>2</sub>-Chlorine

Chlorine is a disinfectant for tap water and dangerous for fishes.

Filter tap water through Active carbon or treat tap water with eSHa Biosafe to remove chlorine and make tap water fish friendly.

### Measurement:

Compare the Cl<sub>2</sub> colour of the test square with the reference colour chart. A colour from 0.8 on the

test square indicates chlorine in your tapwater or aquariumwater.



NO<sub>3</sub> NO<sub>2</sub> GH/TH KH/TAC pH Cl<sub>2</sub>

If you have problems with the water quality it's a good idea to consult your aquarium specialist, who is usually glad to be of help. However, you don't have to be a chemist to make sure your aquarium meets the necessary basic requirements for remaining healthy and in good shape. If you regularly test the water it's easier for you to take proper care of the fish and plants and to keep disaster at a distance. Check the water quality on a regular basis, once every 2 to 3 weeks; for new aquaria or ponds once a week for 4 weeks. If you have problems with the water quality, you should test more often. Check the quality of the water you add.

### Instructions

- 1 With dry hands remove one eSHa Aqua-Quick-Teststrip from container and close container immediately.  
Do not touch test squares with your fingers.
- 2 Dip test strip for one second in aquarium or pond water. All test squares on the strip should be immersed.
- 3 Gently shake any remaining water off test strip. Do this with one quick shake.
- 4 Chlorine: Compare the colour of the Chlorine field immediately with the colour on the container.
- 5 Compare the remaining colours on the test strip after 60 seconds with the colour chart on the container.
- 6 Write down the values measured and other relevant data (date, time, place and water temperature) in the record of measurements included with these instructions.
- 7 If necessary, take steps to restore the water quality in your aquarium or pond.  
When in doubt, contact a reputable aquarium specialist.

### Attention!

Make sure the seal on the lid is intact before first use! Never hold the strips under running water! Always dip the test strips directly in the water. If you test a sample of aquarium or pond water in a glass or cup, make sure that it's completely clean. Substances left behind in the glass, such as detergents, can influence the test results.

Test strips are sensitive; close the container immediately after taking out a test strip. Store the container with strips in a dry and cool (maximum 30 °C) place. Do not touch the test squares with fingers. Always store the container in the original packaging.



