

Instructions

TetraTest Laborett

1. Why test aquarium water?

In any given area the water quality is determined by local conditions. Pure rain water starts to absorb pollutants even as it falls through the atmosphere. As it permeates through the soil and lies as ground water, its chemical composition is affected by the nature of the earth's strata in the locality and the level of contaminants these contain. The various treatments that are used to produce pure drinking water and the mains and pipes that carry the water to our homes can also contribute elements such as chlorine, copper and zinc that are harmful to aquarium life. Due to these many influences, no two types of tap water are alike - and vast differences often occur between neighboring towns. The chemical and biological processes in an aquarium bring about still further changes in the water quality. In order for the flora and fauna to thrive, the conditions in the aquarium have to be suitable and must correspond as closely as possible to those of their natural habitat. The biological balance and hence the well-being of fish and plants depends fundamentally upon the quality of the water in which they live.

With the TetraTest Laborett you will have a reliable and accurate means of measuring the general hardness, carbonate hardness, pH value, nitrite and carbon dioxide content of your aquarium water.

2. The water values

General and carbonate hardness

General hardness (GH)

The general hardness of water is determined by the concentration of calcium and magnesium salts. Where the level of these salts is high, the water is classified as hard and when it is low, as soft. A favorable GH value at which most ornamental fish can be kept, is between 6° dH and 16° dH (°dH = degrees of German hardness).

Carbonate hardness (KH)

As well as the calcium and magnesium salts already mentioned, almost every type of water contains further salt components, such as bicarbonates - their levels in the water are indicated by the KH-value. The bicarbonates have an important task to fulfill in the aquarium, acting as a pH-buffer and thus preventing a drastic or sudden change in the pH value, as in the case of an acid collapse. Due to the close interaction between the KH and pH values, the carbonate hardness also has a direct influence on the well-being of all the organisms in the aquarium. A KH value between 3° dH and 10° dH is generally recommended though fish from the East African Rift lakes (Malawi and Tanganyika) are adapted to living with higher levels of carbonate hardness.

pH Value

The pH value is calculated from the total amount of acidic and basic substances dissolved in the water that could either acidify the water or turn it alkaline. Chemically pure water has a pH value of 7 and is designated as neutral. In it the acid and alkaline components are equally balanced. The more acids that are present, the lower the pH value. The more basic components present, the higher the pH value rises. A sudden lowering of the pH value can occur, for instance, in very soft water if the bicarbonate (KH value) buffer is used up. All fish, plants and micro-organisms are very sensitive to drastic changes in pH and for this reason you should test the pH value at least once a week. A pH value of between 6.5 and 8.5 will suit almost every species of fish encountered in the freshwater aquarium. Fish originating from blackwater rivers prefer soft water with pH values between 6.0 and 7.5 whilst East African cichlids find values in the range between 7.5 and 8.5 and a high carbonate hardness very acceptable.

The nitrite content (NO₂)

Due to fish excreta, decaying plant residues and left-over food, organic substances inevitably find their way into the water. In the course of biological breakdown, organic matter in solution in the aquarium water can form harmful nitrogenous substances. The first stage of this process is the formation of either toxic ammonia or non-poisonous ammonium. The pH value has a great effect on the amount of ammonia or ammonium formed: at a pH value of 7.0 and below, all that will form is non poisonous ammonium; if the pH moves to figures over 7.5 - 8, your aquarium may contain toxic levels of ammonia. In the second stage the ammonia is broken down into nitrite with the aid of nitrosomonas bacteria. Nitrite is poisonous and very harmful to fish. So it is clear that if the nitrite figure is too high,

water quality will be seriously affected. Aquaria with an effective filtration system have nitrite concentrations of 0.3 mg/l or lower. In the long term the nitrite content should not exceed 0.8 mg/l because at these levels it can have a dangerous effect on your fish.

The CO₂ Content

Carbon dioxide (CO₂) constitutes an important basic element in the nutrition and growth of plants. The optimum long term concentration in the aquarium is between 5 and 15 mg/l; concentrations in excess of this may produce adverse effects over a period of time.

3. The test procedure

In order to ensure that you have a permanent monitoring system for the quality of your aquarium water, we recommend that you check out all the parameters once a week.

General and Carbonate Hardness

General hardness and carbonate hardness are measured individually with the appropriate test solution. The same procedure applies to both tests:

1. Rinse the test vial and syringe with aquarium water.
2. Fill the test vial to the 5 ml mark using the syringe provided.
3. Hold the GH reagent-bottle for general hardness or KH bottle for the carbonate hardness over the test vial and release droplets of the test liquid one by one. After each droplet shake the test vial gently, repeating until the water changes color.

For the GH Test: from RED to GREEN

For the KH Test: from BLUE to YELLOW

Note: If the color change occurs right after the first drop, the level is between 0 and 1° dH.

The number of drops that need to be added to bring about the color change corresponds to the degree of hardness of the water (1 drop of test liquid = 1°dH).

Once the measurement has been done, wash out the test vial and syringe with tap water.

Useful tip: If you use 10 ml of aquarium water in these tests, the accuracy of the measurements is enhanced (1 drop of test liquid = 1/2° dH).

Warning:

Keep out of reach of children! GH: Highly flammable! Contains ethyl alcohol. Keep away from sources of ignition. KH: Inflammable! Contains ethyl alcohol.

The pH Value

1. Rinse the test vial and syringe with aquarium water.
2. Fill the test vial with aquarium water to the 5 ml mark using the syringe provided.
3. Hold the pH reagent bottle over the test vial and add 7 drops.
4. Close the cover on the test vial and shake gently.
5. Compare with the pH color scale (see enclosed color chart) and read off the figures.
6. On completion of the test, rinse out the test vial and syringe with tap water.

Warning: Keep out of reach of children! Inflammable! Contains 2-Propanol.

The Nitrite Content (NO₂⁻)

1. Rinse the test vial and syringe with aquarium water.
 2. Fill the test vial to the 5 ml mark using the syringe provided.
 3. Hold the reagent bottle over the test vial and add 7 drops of Nitrite 1 test liquid.
 4. Close the cover on the test vial and shake gently.
 5. After 10 seconds open the test vial and add 7 drops of Nitrite 2 test liquid.
 6. Reclose the test vial and shake again.
 7. Leave the test vial to stand for 2 to 5 minutes and then compare the shade of the liquid with the color scale (see enclosed color chart) and read off the figures.
 8. On completion of the test, wash out the test vial and syringe with tap water.
- The TetraTest Nitrite measures nitrite ion concentration (NO₂⁻).

Warning: Keep out of reach of children! Inflammable! Contains ethyl alcohol.

The CO₂ Content

Once you have determined the pH value and carbonate hardness, you will be able to work out the CO₂ content of your aquarium water from the following CO₂ calculation table. The figures relate to a water temperature of 25 °C. The difference between CO₂ values prevailing at other water temperatures and the figures shown in this table is insignificant. The recommended CO₂, pH and KH values are enclosed within the field marked in white.

4. What do you do if the figures look bad?

There is no single formula for obtaining the ideal aquarium water - nor can there be one, because no two aquariums are alike. Each and every one constitutes a unique and individual micro-habitat. The reasons for this lie in the multitude of variables that make up the mini eco-system: the different stocking levels for fish and plants; the nature of the tap water; and, last but not least, aquarium size. We therefore recommend that you consult your local dealer at the outset when you are contemplating setting up an aquarium. He will tell you the type of water that will best suit the fish you have in mind. If at some stage you find that your aquarium water quality has drifted into figures that are unacceptable, you should also ask your dealer for advice. He is sure to know a few tips that will enable you to bring back the right balance for your fish and plant stocks -and without doubt he'll have the right product on his shelves.

KH
(°dH)

	CO ₂ concentration in mg/l														
1	347	108	34	19	11	6	3	2	1	1	0.3	0.2	0.1	0.1	0.1
2	669	209	66	37	21	12	7	4	2	1	0.7	0.4	0.2	0.1	0.1
3	981	308	97	55	31	17	10	5	3	2	1.0	0.5	0.3	0.2	0.1
4	1284	404	128	72	40	23	13	7	4	2	1.3	0.7	0.4	0.2	0.1
5	1581	498	157	88	50	28	16	9	5	3	1.6	0.9	0.5	0.3	0.1
6	1873	590	186	105	59	33	19	10	6	3	1.8	1.0	0.6	0.3	0.2
7	2159	681	215	121	68	38	21	12	7	4	2.1	1.2	0.7	0.4	0.2
8	2440	770	243	137	77	43	24	14	8	4	2.4	1.3	0.7	0.4	0.2
9	2718	858	271	152	86	48	27	15	9	5	2.7	1.5	0.8	0.5	0.2
10	2992	944	298	168	94	53	30	17	9	5	3.0	1.6	0.9	0.5	0.3
11	3262	1030	325	183	103	58	33	18	10	6	3.2	1.8	1.0	0.5	0.3
12	3529	1114	352	198	111	63	35	20	11	6	3.5	1.9	1.1	0.6	0.3
13	3793	1198	379	213	120	67	38	21	12	7	3.7	2.1	1.1	0.6	0.3
14	4054	1280	405	227	128	72	40	23	13	7	4.0	2.2	1.2	0.7	0.4
15	4312	1362	430	242	136	76	43	24	14	8	4.2	2.4	1.3	0.7	0.4
16	4568	1443	456	256	144	81	46	26	14	8	4.4	2.5	1.4	0.8	0.4
17	4820	1523	481	271	152	86	48	27	15	8	4.7	2.6	1.5	0.8	0.4
18	5072	1602	506	28;	160	90	51	28	16	9	5.0	2.8	1.5	0.9	0.5
19	5320	1681	531	297	168	94	53	30	17	9	5.2	3.0	1.6	0.9	0.5
20	5566	1758	556	313	176	99	56	31	17	10	5.5	3.0	2.0	1.0	0.5
pH-value	5.00	5.50	6.00	6.25	6.50	6.75	7.00	7.25	7.50	7.75	8.00	8.25	8.50	8.75	9.00

A few basic ground rules

- Carry out regular partial water changes, using the appropriate tap water conditioning product, such as TetraAqua AquaSafe, replacing 1/4 to 1/3 of the water every 2 to 4 weeks.
- Make sure that you have dense, healthy plant growth. Thriving plants take nitrate out of the water and thus stabilize the biological state of the aquarium. Use nitrate- and phosphate-free fertilizers such as TetraPlant PlantaMin, TetraPlant Crypto Fertilizers and TetraPlant InitialSticks, because these supply the aquatic plants with balanced quantities of micro- and trace

elements.

- Make sure that you have a properly functioning, biological filtration system suited both to the size of your tank and the number of fish in it.
- Avoid overstocking the aquarium with fish.
- Only give the fish the amount of food they can eat within a few minutes – we recommend the proven Tetra range of quality fish foods.
- In a newly set up tank the filtration system will take about 4 to 6 weeks to become biologically activated.

How to correct the water quality

- If the nitrite content is too high, carry out an immediate water change using ready conditioned water.
- Where the CO₂ value is too low you can raise it to a level within the optimum range by adding CO₂ with the Tetra CO₂ Optimal. An excessively high CO₂ concentration can be lowered by aerating the aquarium with an air stone or an air pump, e.g. the Tetratec AP Air Pump.
- An excessively high pH value can be lowered by treatment with carbon dioxide (CO₂) fertilizer using the Tetra CO₂ Optimal. CO₂ acidifies the water and at the same time improves plant growth.
- If the pH value is too low, test the carbonate hardness of the aquarium water with the Tetratest KH. Where the carbonate hardness is below 1° to 2° dH - or 6°dH in marine aquaria - then the water should be hardened by putting limestone or marble chippings in the tank. Generally speaking, the pH value of the water can also be raised by driving out excess CO₂ or aerating the aquarium by means of the Tetratec AP Air Pump. Night-time aeration of the aquarium is thoroughly recommended. You will find the relevant specialist magazines and text books a useful source of further hints and advice. If you have any specific problems, see your local dealer - he's always keen to help.

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