

**Mardel<sup>®</sup>**

# Fish Care Guide

for Freshwater  
and Saltwater  
Aquariums

**Virbac**  
ANIMAL HEALTH

***Mardel***<sup>®</sup>  
***Water Quality Guide***

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## ***Why should I be concerned about Water Quality?***

Quality of water has serious effects on the health of fish. In properly balanced water, fish lead healthy lives. In poor water quality, they may suffer and even die. Although the water may look clean and pure in your aquarium, it contains dissolved materials that have an effect on your fish and their water conditions.

Aquarium water may contain:

- Certain disinfectants such as chloramines and chlorine (if added through tap water)
- Chemicals that cause the pH to be acidic, basic or neutral
- Dissolved carbonates and bicarbonates that stabilize pH (buffering capacity)
- Dissolved forms of calcium and magnesium (total hardness)
- Organic material
- Dissolved nitrate
- Parasites or bacteria that are harmful to fish

So as you see, even though your water may be crystal clear, it may not necessarily be of high quality. You can only be sure of your water quality by testing it. A regular program to test, adjust and maintain your water chemistry is essential.

## ***What do I need to know about water chemistry to keep fish healthy?***

A basic understanding of water chemistry is important because you control the fish's environment. Fish have a preferred set of water conditions in which they like to live. When gradual changes occur to their natural environment (rivers, lakes or oceans), fish can adapt. However, when major changes occur, fish will flee to a new environment that they are more accustomed to. Unlike a fish's natural environment, an aquarium is a closed system. When changes do occur, a fish does not have the ability to flee to new water conditions. Because of this major difference between a natural and closed system, it is critical to provide the quality of water that meets the physical needs of the fish.

## ***What are the important chemical properties of aquarium water I need to know?***

There are many different physical, chemical and biological properties that are important in determining the quality of water. Fortunately, in an aquarium, it is not necessary to measure all of these properties since only a few will cause distress to fish. Mardel Test Strips and water conditioners allow you to monitor and adjust water quality to maintain a healthy environment.

## *Mardel 5 in 1 Test Kit*

### **pH, Hardness, Alkalinity, Nitrite and Nitrate**

Three important chemical properties of water that define the water's characteristics are **pH, Alkalinity (Buffering Capacity)** and **Total Hardness**.

**pH** is a term used to describe the degree of acidity or basicity of a solution. It is measured on a 14 point scale where pH=1 is strongly acid, pH=7 is neutral and pH=14 is strongly basic. The majority of fish species are found in fresh water with a pH level between 6.0 and 8.0 and in saltwater between 8.0 and 8.4. It is important to maintain the waters pH value at a relatively constant point.

**Total Alkalinity** (sometimes referred to as Buffering Capacity) as measured by Mardel Test Strips, indicates the total amount of buffers (pH stabilizing compounds) that are present in the water. Adequate buffering capacity protects the environment from sudden changes in pH by absorbing excess acids or bases, which may be added to a solution. An accurate reading of pH cannot be obtained without an adequate level of buffering capacity, above 120 ppm (parts per million).

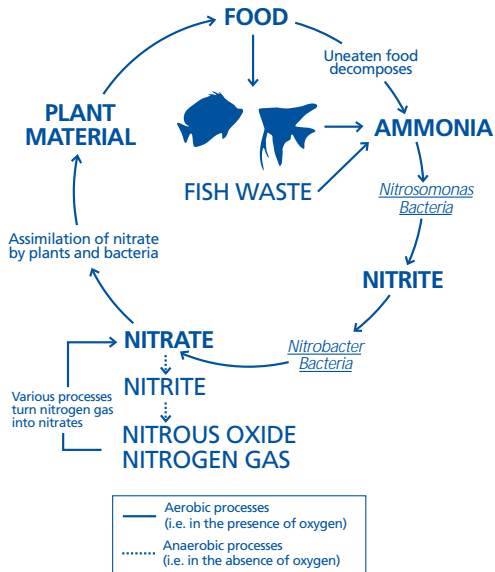
**Water Hardness** is a measure of the quantity of certain metallic ions present in the water, mainly calcium and magnesium. Water hardness affects a fish's ability to maintain the balance between its internal body fluids and the external environment.

### **Nitrite and Nitrate**

In your aquarium, bacteria converts toxic ammonia to a less toxic chemical called nitrate. The first of these "good" bacteria, *Nitrosomonas*, converts ammonia to **NITRITE**. The second "good" bacteria, *Nitrobacter*, converts nitrite to **NITRATE**. Nitrate is less toxic than nitrite and can be used as a food source by live plants. This process of changing harmful ammonia to nitrate is called the **NITROGEN CYCLE** (See the diagram on the next page.)

For the nitrogen cycle to work, your tank must have large enough numbers of both of these "good" bacteria present in the system. The most common cause of fish death in new aquariums is the good bacteria have not had enough time to grow. This sudden unexplained death of fish is commonly referred to as "new tank syndrome". It is a result of an accumulation of ammonia and nitrite in the water. For the bacteria to become fully established, 4 to 6 weeks is usually necessary.

# NITROGEN CYCLE



## I. Directions

- (1) Dip strip into the water to be checked and remove immediately. Be sure to dip all five pads into the water. Do not shake excess water from strip.
- (2) Hold strip level and at 30 seconds compare pH, Hardness, Alkalinity and Nitrite pads and record the results to your best estimated value.
- (3) At 60 seconds compare Nitrate pad to color chart.  
*Note:* 1. The buffering capacity must be at least 120 ppm for accurate pH measurement.  
2. For Saltwater, Total Hardness values are not recorded using Mardel Test Strips.
- (4) Discard strip when finished. Reuse will not give accurate results.
- (5) Interpret your results.



## II. Interpretation of Results

Freshwater fish have the ability to adapt to different water conditions if changes are made gradually. Saltwater fish live in a very stable environment and have some ability to adapt to different water conditions if changes are small and are made very gradually.

However, different types of fish prefer certain water conditions. For a few examples of freshwater and saltwater tank conditions, the following readings are within acceptable ranges:

	pH	Total Hardness (ppm)	Buffering Capacity (ppm)
Community Tank	6.8 - 7.6	120 - 300	120 - 240
South American Cichlids	5.8 - 6.4	20 - 60	120 - 180
African Cichlids	7.7 - 8.8	160 - 320	180 - 240
Live Bearers	7.0 - 7.5	200 - 450	180 - 240
Saltwater Fish Only	8.0 - 8.4	-	120 - 300
Saltwater Mini Reef	8.0 - 8.4	-	200 - 300

Nitrite is the second most toxic nitrogen compound after ammonia. Nitrite levels above 0.75 ppm (parts per million) can cause stress and greater than 5 ppm can be toxic.

Nitrate is the least toxic of the nitrogen compounds. However, at high levels it can pose a threat. Recent research has concluded that continuously high nitrate levels (freshwater 200+ ppm) are a possible cause of stress to fish. It also adversely affects water quality by encouraging excessive algae growth. In Saltwater aquariums, research has concluded that levels greater than 20 ppm are a possible cause of stress to marine fish. Marine invertebrates are even more sensitive to nitrate, where levels greater than 10 ppm can cause stress.

Some published literature refers to nitrates as *Nitrate Nitrogen*. Mardel AquaLab Test Strips measure concentrations of nitrate ion ( $\text{NO}_3^- \text{N}$ ). To convert your results into nitrogen readings ( $\text{NO}_3^- \text{N}$ ), divide the test results by 4.4.

The 5 in 1 **nitrate test pad** measures both nitrate and nitrite levels present in the water. To determine true nitrate levels, subtract the nitrite reading from the nitrate reading. Normally in established aquariums, the adjusted nitrate value is within the accuracy of the initial nitrate pad reading.

### III. Recommended Adjustments

To adjust water conditions that are outside desired ranges:

#### Conditions

To lower pH

To Raise pH

To Lower Hardness (Freshwater only)

To Raise Hardness (Freshwater only)

To Increase Buffering Capacity

To Lower Buffering Capacity

To Lower Nitrite

To Lower Nitrate

Read all product instructions carefully before carrying out adjustments

(*Note:* It will take at least 24 hours to affect readings when using A.C.T.<sup>®</sup> to control nitrite).

#### Recommendation

Use pH-Minus<sup>™</sup>

Use pH-Plus<sup>™</sup>

Use Tank Soft<sup>®</sup>

Use Tank Hard+<sup>®</sup>

Use Buffer-Up<sup>®</sup>

Use small amounts of pH-Minus<sup>™</sup>

Perform water changes & use A.C.T.<sup>®</sup> to boost biological filtration or use Ion exchange resins that remove nitrites.

Perform water changes or use Ion exchange resins that remove nitrate.

### *Mardel Starter Test*

pH, Hardness, Nitrite and Total Chlorine

**pH** is a term used to describe the degree of acidity or basicity of a solution. It is measured on a 14 point scale where pH=1 is strongly acid, pH=7 is neutral and pH=14 is strongly basic. The majority of fish species are found in fresh waters with a pH level between 6.0 and 8.0 and in saltwater between 8.0 and 8.4. It is important to maintain the waters pH value at a relatively constant point.

**Water Hardness** is a measure of the quantity of certain metallic ions present in the water, mainly calcium and magnesium. Water hardness affects a fish's ability to maintain the balance between its internal body fluids and the external environment.

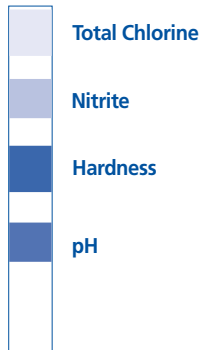
**Nitrite** - Certain "good" bacteria live in your aquarium. Over time these bacteria convert toxic ammonia to a less toxic chemical called nitrate. One of these "good" bacteria, *Nitrosomonas*, converts ammonia to **NITRITE**. Nitrite is a toxin in aquatic systems and at high concentrations can lead to major fish losses.

Most public and private water systems are treated to destroy harmful bacteria and other organisms. These treatments, although not harmful to humans, leave residual chemicals that can cause harm to your fish. **Chlorine** (total and free) and **Chloramine** are the most commonly used treatments and are two more important chemical properties that may be present in your aquarium.

Chloramine treatments have become popular because they are more advantageous in disinfecting water. They are more stable, have no chlorine odor and are very effective. Unfortunately, chloramines are even more toxic to fish than chlorine and are more difficult to remove. For this reason it is important to test your tap water before adding it to your aquarium.

### I. Directions

- (1) Dip strip into water to be tested and remove immediately. Be sure to dip all four pads into the water. **Do not shake excess water from strip.**
- (2) Hold strip level and allow colors to develop. At 30 seconds compare pads to color chart and record the results to your best estimated value.
- (3) Discard strip when finished. Reuse will not give accurate results.
- (4) Interpret your results.



### II. Interpretation of Results

For pH and Hardness see interpretation of results under Mardel 5 in 1 test kit. Nitrite is the second most toxic nitrogen compound after ammonia. Nitrite levels above 0.75 ppm (parts per million) can cause stress and greater than 5 ppm can be toxic. Total Chlorine is safe when reading is zero.

### III. Recommended Adjustments

To adjust water conditions that are not safe:

<u>Condition</u>	<u>Recommendation</u>
To lower pH	Use pH-Minus™
To Raise pH	Use pH-Plus™
To Lower Hardness (Freshwater only)	Use Tank Soft®
To Raise Hardness (Freshwater only)	Use Tank Hard+®
Remove Total chlorine	Use Marchlor® or Marplex®
Remove Free Chlorine	Use Marchlor® or Marplex®
Remove Chloramine	Use Marplex®
To Lower Nitrite	Perform water changes & use A.C.T.® to boost biological filtration or use Ion exchange resins that remove nitrites.

Read all product instructions carefully before carrying out adjustments.

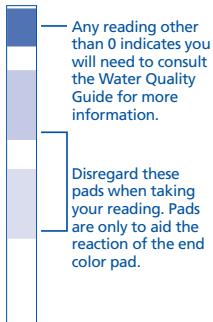
## Mardel Ammonia

Because your aquarium is a closed system, fish waste will build up if the water is left unfiltered. The most common and harmful waste product in your fish tank is **AMMONIA**. Ammonia is caused by fish waste and excess food in your aquarium. Ammonia is very harmful to your fish, leading to severe irritation of the skin and gills. High ammonia levels can result in the death of your fish.

### I. Directions

For best results test should be preformed in a well-lit area.

- (1) Remove test strip from bottle and replace cap.
- (2) Fill test tube above top line with aquarium water.
- (3) Vigorously move test strip up and down in water sample for 30 seconds, making sure **all pads** are submerged.
- (4) Remove test strip and shake off excess water. Wait 30 seconds for color to fully develop.
- (5) Hold test strip with pads facing away from you, and read **small pad through back of plastic strip**.
- (6) Compare pad to color chart, record the results to your best-estimated value, and dispose of test strip.
- (7) Rinse test tube and store separately.
- (8) Interpret your results.



## II. Interpretation of Results

There are two factors that contribute to the level of toxicity of ammonia in freshwater aquariums; pH and water temperature. It is necessary to know the pH and temperature of your aquarium to make an accurate assessment of the danger of the recorded ammonia results. Refer to the charts on these pages for the effects of pH and temperature on ammonia. In saltwater, salinity also contributes to the level of ammonia toxicity. Ammonia toxicity decreases with increasing salinity. In saltwater and freshwater of the same pH, the ammonia is 30 percent less toxic in the saltwater. However since saltwater is typically higher in pH, this reduction in toxicity is very small.

### Temperature Effect

#### Water Temperature

	50°F (10°C)	59°F (15°C)	68°F (20°C)	77°F (25°C)
6.5	33.3	22.2	15.4	11.1
7.0	10.5	7.4	5.0	3.6
7.5	3.4	2.3	1.6	1.2
8.0	1.1	0.7	0.5	0.4
8.5	0.4	0.3	0.2	0.1

Values are maximum recommended levels of Total Ammonia (as ppm of mg/liters of Nitrogen)

So as a general rule, as temperature and pH rise, so do the harmful effects of ammonia. It is always recommended to keep ammonia levels at zero to ensure the safety of your fish.

### pH Effect

#### Total Ammonia Concentration (ppm NH<sub>3</sub>-N)

0      0.25      0.5      1      3      6

pH	Total Ammonia Concentration (ppm NH <sub>3</sub> -N)					
	0	0.25	0.5	1	3	6
6	SAFE	SAFE	SAFE	SAFE	SAFE	SAFE
6.4	SAFE	SAFE	SAFE	SAFE	SAFE	SAFE
6.8	SAFE	SAFE	SAFE	SAFE	SAFE	STRESS
7.2	SAFE	SAFE	SAFE	SAFE	STRESS	STRESS
7.6	SAFE	SAFE	SAFE	STRESS	STRESS	SLOW DEATH
8	SAFE	SAFE	STRESS	STRESS	SLOW DEATH	RAPID DEATH
8.4	SAFE	STRESS	SLOW DEATH	SLOW DEATH	RAPID DEATH	RAPID DEATH
8.8	SAFE	SLOW DEATH	RAPID DEATH	RAPID DEATH	RAPID DEATH	RAPID DEATH

INDICATIONS ARE FOR AMMONIA CONCENTRATION AT 77° F

### III. Recommended Adjustments

#### Condition

To remove Ammonia

To Boost Biological Filtration

#### Recommendation

Use Marplex®

Use A.C.T.®

Read all product instructions carefully before carrying out adjustments.

(A.C.T.® will take at least 24 hours to begin to affect ammonia levels so treatment with Marplex® is recommended first.)

**NOTE: With certain ammonia removal chemicals, a false reading will be recorded by the Mardel Ammonia Test Strip if used immediately after chemical treatment. Wait 48 hours after treatment before retest.**

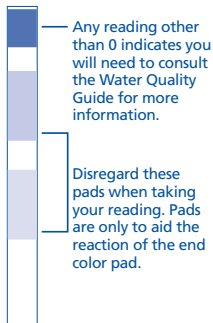
## Mardel Small Bowl Test

Because your bowl (small aquarium) is a closed system, fish waste will build up if the water is left unfiltered. The most common and harmful waste product in your fish bowl is **AMMONIA**. Ammonia is caused by fish waste and excess food in your aquarium. Ammonia is very harmful to your fish, leading to severe irritation of the skin and gills. High ammonia levels can result in the death of your fish.

### I. Directions

For best results test should be performed in a well-lit area.

- (1) Remove test strip from bottle and replace cap.
- (2) Fill test tube above top line with aquarium water.
- (3) Vigorously move test strip up and down in water sample for 30 seconds, making sure **all pads** are submerged.
- (4) Remove test strip and shake off excess water. Wait 30 seconds for color to fully develop.
- (5) Hold test strip with pads facing away from you and read **small pad through back of plastic strip.**
- (6) Compare pad to color blocks and dispose of test strip.
- (7) Rinse test tube and store separately.
- (8) Interpret your results.



### II. Interpretation of Results

The small bowl test kit measures ammonia and has two color blocks to interpret; a zero reading and a reading that indicates the presence of ammonia. No water changes are necessary with a zero reading. If ammonia is detected, then a partial water change is indicated.

### III. Recommended Adjustments

#### Condition

To remove Ammonia

To Boost Biological Filtration

Read all product instructions carefully before carrying out adjustments.

(A.C.T.<sup>®</sup> will take at least 24 hours to begin to affect ammonia levels so treatment with Marplex<sup>®</sup> is recommended first.)

**NOTE: With certain ammonia removal chemicals, a false reading will be recorded by the Mardel small bowl Test Strip if used immediately after chemical treatment. Wait 48 hours after treatment before retest.**

#### Recommendation

Carry out a partial water change or use Marplex<sup>®</sup>

Use A.C.T.<sup>®</sup>

## *Mardel Master Test*

### **pH, Hardness, Alkalinity, Nitrite, Nitrate and Ammonia**

The Mardel master test contains both the Mardel 5 in 1 test and the Mardel Ammonia test strips. For detailed discussion on use and interpretation of results, see the individual directions for each test strip type presented earlier in this guide.

#### **pH-Plus™**

##### **I. Indications**

pH-Plus™ should be used when the pH of aquarium water is too low. Most fish can adapt to a wide pH range as long as the change is gradual. The following are suggestions for the environment of certain groups of fish.

	<b>pH range</b>
Community Tank	6.8 - 7.6
African Cichlids	7.7 - 8.8
South American Cichlids	5.8 - 6.4
Live Bearers	7.0 - 7.5
Saltwater Fish Only	8.0 - 8.4
Saltwater Mini Reef	8.0 - 8.4

## **II. Directions**

*Important:* For new tanks, make all changes before adding fish. Before making any pH changes, make sure that the buffering capacity (total alkalinity) of the aquarium is in the range 120 ppm. Add Buffer-Up® to increase buffering capacity, if required, as directed in the product instructions.

Using the special enclosed measuring spoon, use one level spoonful of pH-Plus™ for every 20 gallons of water. This amount gives approximately a 0.2 pH change when the water is in the range 7.0 to 7.5.

First dissolve required amount of pH-Plus™ in about 8 ounces of water. Then pour evenly over aquarium water. Let solution mix thoroughly. Allow at least 30 minutes before retesting. The amount of pH-Plus™ needed will vary with the size of tank and the condition of your water. Remember, you want to make changes over a long period of time...days not hours. The recommended change in pH when fish are present is 0.3 pH points per day. Make all environmental changes gradually. Be sure and measure pH and Buffering Capacity of tanks before and after the addition of pH-Plus™.

## I. Indications

pH-Minus™ should be used when the pH of aquarium water is too high. Most fish can adapt to a wide pH range as long as the change is gradual. The following are suggestions for the environment of certain groups of fish.

	<b>pH range</b>
Community Tank	6.8 - 7.6
African Cichlids	7.7 - 8.8
South American Cichlids	5.8 - 6.4
Live Bearers	7.0 - 7.5
Saltwater Fish Only	8.0 - 8.4
Saltwater Mini Reef	8.0 - 8.4

## II. Directions

*Important:* For new tanks, make all changes before adding fish. Before making any pH changes, make sure that the buffering capacity (total alkalinity) of the aquarium is in the range 120 ppm – 250 ppm. Add Buffer-Up® to increase buffering capacity, if required, as directed in the product instructions.

Using the special enclosed measuring spoon, use one level spoonful of pH-Minus™ for every 10 gallons of water. This amount gives approximately a 0.2 pH change when the water is in the range 8.0 to 7.5.

First dissolve required amount of pH-Minus™ in about 8 ounces of water. Then pour evenly over aquarium water. Let the solution mix thoroughly. Allow at least 30 minutes before retesting. The amount of pH-Minus™ needed will vary with the size of the tank and the condition of your water. Remember, you want to make changes over a long period of time... days not hours. The recommended change in pH when fish are present is 0.3 pH points per day. Make all environmental changes gradually. Be sure and measure pH and Buffering Capacity of tanks before and after the addition of pH-Minus™.

## I. Indications

Buffer-Up® should be used when Mardel Test Strips indicate insufficient buffering capacity (low total alkalinity). Properly buffered water has a 120 – 250 ppm buffering capacity reading. Buffering capacity in this range allows for accurate pH measurement and stabilizes the pH. Sudden changes in pH are very stressful to fish. Water with a low level of buffering capacity is susceptible to changes in pH.

## II. Directions

*Important:* For new tanks, make all changes before adding fish. Using the special enclosed measuring spoon, use one level spoonful of Buffer-Up® for every 10 gallons of water. This amount gives approximately a 40 – 60 ppm increase in the buffering capacity without significantly changing the pH.

First dissolve required amount of Buffer-Up® in about 8 ounces of water. Then pour evenly over aquarium water. Let solution mix thoroughly. Allow at least 30 minutes for reaction to take place before retesting. The amount of Buffer-up® needed will vary with the size of the tank and the condition of your water. Remember you want to make changes over a long period of time... days not hours.

In addition to pH-Plus™, pH-Minus™ and Buffer-Up®, Mardel carries a full line of water conditioners to correct all your water quality problems:

<u>Conditions</u>	<u>Recommendation</u>	<u>Water Conditions</u>
To lower water hardness	Tank Soft®	Freshwater
To raise water hardness	Tank Hard+®	Freshwater
To remove toxic chlorine	Marchlor®	Freshwater
To remove toxic ammonia, chlorine and chloramines and provide a protective slime coat.	Marplex®	Fresh/Saltwater
To naturally control ammonia & nitrite levels	A.C.T.®	Fresh/Saltwater
To naturally control ammonia, nitrite levels & neutralize chlorine	Tank Safe®	Freshwater
To clear cloudy water	Brite N' Clear®	Freshwater
To provide a protective slime coat and reduce stress and aggressive behavior.	Stress Therapy	Fresh/Saltwater

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