

# Correct Values of Aquarium Water Parameters

## - Summary Table

### Optimal Aquarium Water Parameters: The Foundation of a Healthy Ecosystem

Maintaining proper water parameters is the cornerstone of a healthy and harmonious aquarium environment. Water is not just the medium where fish and plants live; it is a complex ecosystem whose chemical properties directly influence their health, growth, and well-being. This makes it crucial to monitor key parameters such as pH, hardness (GH and KH), carbon dioxide concentration (CO<sub>2</sub>), nitrites (NO<sub>2</sub>), nitrates (NO<sub>3</sub>), phosphates (PO<sub>4</sub>), and essential minerals like calcium (Ca), magnesium (Mg), and potassium (K).

In this article, we present detailed recommended value ranges that help keep water in perfect condition. These guidelines can prevent issues such as algae outbreaks, nutrient deficiencies, or toxic compounds, while ensuring optimal living conditions for aquarium inhabitants to thrive and grow. Regular water testing and understanding its chemistry are essential keys to success in aquatics!

**A list of aquarium water parameters, ranked from most to least important, taking into account their impact on the health of aquarium inhabitants and the stability of the ecosystem:**

1. NH<sub>3</sub> (Ammonia)
  - a. Safe concentration: 0.02–0.05 mg/L.
  - b. Even a slight increase is highly toxic to fish and other aquatic organisms.
2. NO<sub>2</sub> (Nitrites)
  - a. Level: below 0.1 mg/L.
  - b. Toxic even at low concentrations, can lead to fish poisoning.
3. pH
  - a. Ideal range: 6.5–7.5.
  - b. Affects all chemical processes in water as well as the health of fish and plants.
4. GH and KH (Water Hardness)
  - a. Range: 4–10°dH
  - b. Stabilize water pH and support the health of aquarium inhabitants.
5. CO<sub>2</sub> (Carbon Dioxide)
  - a. Optimal concentration: 15–30 mg/L.
  - b. Crucial for plant photosynthesis and pH stability.
6. NO<sub>3</sub> (Nitrates)
  - a. Recommended level: 10–25 mg/L.
  - b. Excess promotes algae growth, but a small amount is necessary for plants.
7. PO<sub>4</sub> (Phosphates)
  - a. Range: 0.2–1.0 mg/L.
  - b. Supports plant growth, but excess leads to algae development.
8. Ca:Mg (Calcium and Magnesium)
  - a. Ratio: 3:1–4:1.
  - b. The right balance supports plant and animal health and ensures GH stability.
9. K (Potassium)
  - a. Recommended concentration: 10–20 mg/L.
  - b. Essential for the health and growth of aquarium plants.
10. Fe (Iron)
  - a. Optimal level: 0.1–0.5 mg/L.
  - b. Supports plant growth, but excess may cause algae issues.
11. Cu (Copper)
  - a. Level: 0.01–0.03 mg/L.
  - b. Potentially toxic to shrimp and invertebrates, but safe in small amounts.

Parameters such as NH<sub>3</sub>, NO<sub>2</sub>, and pH are of the highest priority, as incorrect values can directly threaten the life of aquarium inhabitants. Other parameters are crucial for maintaining ecological balance and plant health.

Values in mg/L. - The units mg/L (milligrams per liter) and ppm (parts per million) are practically equivalent in the context of water. For liquids with a density close to water (1 g/ml), the relationship is direct: 1 mg/L = 1 ppm, except for pH(3), GH-KH(4), and Ca-Mg (8).

Significance	Parameter	Undervalued (or acceptable for toxic compounds)	Low (or acceptable for toxic compounds)	Correct (or acceptable for toxic compounds)	Elevated	Significantly Overvalued
1	NH3 (Toxic)	< 0.001	0.001 - 0.02	0.02 - 0.05	0.05 - 0.1	> 0.1
2	NO2 (Toxic)	< 0.01	0.01 - 0.03	0.03 - 0.1	0.1 - 0.2	> 0.2
3	pH	< 5.5	5.5 - 6.0	6.5 - 7.5	7.6 - 8.0	> 8.0
4*	Gh-Kh* (°dH)	< 2*	2 - 4*	4 - 10*	11 - 15*	> 15*
5	CO2	< 5	5 - 15	15 - 30	31 - 40	> 40
6	NO3	< 5	5 - 10	10 - 25	25 - 50	> 50
7	PO4	< 0.1	0.1 - 0.2	0.2 - 1.0	1.0 - 2.0	> 2.0
8**	Ca-Mg**	< 2:1**	2:1 - 3:1**	3:1 - 4:1**	4:1 - 6:1**	> 6:1**
8(a)	Ca	< 10	10-30	30-80	80-150	> 150
8(b)	Mg	< 2	2-5	5-15	15-30	> 30
9	K	< 5	5 - 10	10 - 20	20 - 30	> 30
10	Fe	< 0.05	0.05 - 0.1	0.1 - 0.5	0.5 - 1.0	> 1.0
11	Cu (Potentially toxic)	< 0.001	0.001 - 0.01	0.01 - 0.03	0.03 - 0.05	> 0.05



\*The °dH Scale (degrees German hardness, from the German Grad deutscher Härte) is the standard unit used to measure water hardness, which reflects the concentration of dissolved calcium (Ca<sup>2+</sup>) and magnesium (Mg<sup>2+</sup>) ions in water. Water hardness is divided into general hardness (GH) and carbonate hardness (KH).

How Does the °dH Scale Work?

1 °dH corresponds to dissolving 10 mg of calcium oxide (CaO) per 1 liter of water, which is equivalent to:

- 7.14 mg Ca<sup>2+</sup>/L (calcium),
- 4.34 mg Mg<sup>2+</sup>/L (magnesium).

The higher the °dH value, the more minerals (Ca<sup>2+</sup> and Mg<sup>2+</sup>) are present in the water, indicating greater hardness.

**Water Hardness Categories (GH or KH in °dH)**

- **very Soft: 0–4,**
- **soft: 4–8,**
- **moderately Hard: 8–12,**
- **hard: 12–18,**
- **very Hard: >18.**

\*\* The Calcium (Ca) to Magnesium (Mg) Ratio

The Ca:Mg ratio is a crucial parameter in aquarium water, influencing the health of plants and animals. The recommended ratio is 3:1 to 4:1, meaning for every 3–4 parts of calcium, there should be 1 part magnesium.

- **Calcium (Ca):** Essential for fish and plants, supporting skeletal development in fish and overall plant health. A concentration range of 30–80 mg/L is suitable for most aquariums.
- **Magnesium (Mg):** Supports enzyme function, electrolyte balance, and is vital for plants. The optimal level is 5–15 mg/L.

These values help maintain the proper Ca:Mg ratio and general hardness (GH) in the water. If these mineral levels are too low, it can weaken plant and animal health, while excessive concentrations can disrupt water balance.

Recommended Values for a 3:1–4:1 Ratio

**To maintain a correct Ca:Mg ratio while ensuring optimal concentrations for an aquarium, the following ranges are suggested:**

- **Calcium (Ca): 30–80 mg/L**
- **Magnesium (Mg): 5–15 mg/L**

Calculations for 3:1 and 4:1 Ratios:

For a 3:1 Ratio:

- **If Ca is 60 mg/L, Mg should be 20 mg/L.**
- **If Ca is 30 mg/L, Mg should be 10 mg/L.**

For a 4:1 Ratio:

- **If Ca is 80 mg/L, Mg should be 20 mg/L.**
- **If Ca is 40 mg/L, Mg should be 10 mg/L.**

Recommendations:

- Calcium (Ca) should be in the range of 30–80 mg/L, which corresponds to the optimal level for aquariums.
- Magnesium (Mg) should be 1/3–1/4 of the Ca concentration, i.e., 5–15 mg/L, to maintain balance.