

# TOTAL REEF ICP TEST



**Sample ID:** 012215B

**Sample type:** Seawater

**Volume aquarium in Litre:** 170

**Sample name:** Red Sea 170 (Pittsburgh)

**Sampling date:** 08-17-2023

**Date of receipt:** 08-21-2023

Method: ICP-OES (inductively coupled plasma with optical emission spectrometry) and further procedures specifically for seawater.

Recommended values are optimized for coral reef aquariums.

You can find detailed information on the elements as well as recommendations for action and precise dosing instructions at:

<https://lab.faunamarin.de/en/home/analysis/82169>

## Basic physical-chemical values

|                                       | measured | reference range       |
|---------------------------------------|----------|-----------------------|
| Conductivity (mS/cm 25°C)             | 52.7     | 51,7 - 53,0 - 54,5    |
| Density (kg/Liter 25°C)               | 1.023    | 1,022 - 1,023 - 1,024 |
| Specific density (25°C)               | 1.026    | 1,026 - - 1,027       |
| Salinity (ppt, psu)                   | 34.7     | 34,0 - 35,0 - 36,0    |
| pH level                              | 7.88     | 7,90 - 8,30 - 8,40    |
| Carbonate hardness (in °dKH)          | 9        | 6,5 - 7,3 - 8,5       |
| CO <sub>2</sub> (mg/l)                | 3.44     | 0,04 - - 2,5          |
| acid binding capacity pH 4,3 (mmol/L) | 3.21     | 2,3 - 2,58 - 3,0      |
| odor                                  | none     | none                  |
| colour                                | none     | none                  |

## Major elements, lime elements and halogens in mg/Litre (1 mg = 0,001 g)

|                                        | measured | reference range       | rel. 35 psu |
|----------------------------------------|----------|-----------------------|-------------|
| Chloride Cl <sup>-</sup>               | 19207    | 18700 - 19500 - 20300 | 19374       |
| Sodium Na                              | 10687    | 9500 - 10700 - 11500  | 10780       |
| Sulphur S                              | 759      | 850 - 900 - 950       | 766         |
| Sulphate SO <sub>4</sub> <sup>2-</sup> | 2274     | 2550 - 2700 - 2850    | 2294        |
| Potassium K                            | 383      | 380 - 395 - 420       | 386         |
| Boron B                                | 6.64     | 3,80 - 4,50 - 5,50    | 6.7         |
| Magnesium Mg                           | 1415     | 1200 - 1350 - 1450    | 1427        |
| Calcium Ca                             | 473      | 400 - 425 - 440       | 477         |
| Strontium Sr                           | 10.2     | 6,50 - 8,00 - 9,00    | 10.29       |
| Bromine Br                             | 93.1     | 55,0 - 67,0 - 75,0    | 93.9        |
| Fluoride F <sup>-</sup>                | 0.74     | 0,90 - 1,30 - 1,60    | 0.75        |
| Iodine (total iodine, ICP-OES) I       | 0.273    | 0,055 - 0,065 - 0,080 | 0.275       |

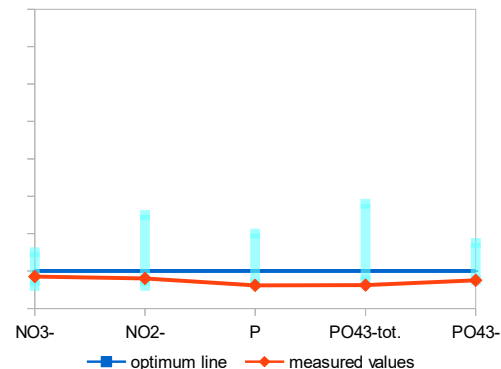
## Relational values major elements and halogens - graphic representation salinity line

|                                                                    | relational value | reference range    | Salinity line                                 |
|--------------------------------------------------------------------|------------------|--------------------|-----------------------------------------------|
| Salinity measured : nominal Sal.                                   | 0.99             | 0,97 - 1,00 - 1,03 |                                               |
| KH measured : nominal KH                                           | 1.24             | 0,90 - 1,00 - 1,17 |                                               |
| Magnesium : Salinity Mg                                            | 40.8             | 33,3 - 38,6 - 42,6 |                                               |
| Calcium : Salinity Ca                                              | 13.6             | 11,1 - 12,1 - 12,9 |                                               |
| Strontium: Salinity Sr                                             | 0.29             | 0,18 - 0,23 - 0,26 |                                               |
| Potassium : Salinity K                                             | 11               | 10,6 - 11,3 - 12,4 |                                               |
| Boron : Salinity B                                                 | 0.19             | 0,11 - 0,13 - 0,16 |                                               |
| Chloride : Salinity Cl <sup>-</sup>                                | 554              | 519 - 557 - 597    |                                               |
| Sulphate : Salinity SO <sub>4</sub> <sup>2-</sup>                  | 65.5             | 71,0 - 77,0 - 84,0 |                                               |
| Chloride : Sulphate Cl <sup>-</sup> /SO <sub>4</sub> <sup>2-</sup> | 8.45             | 6,60 - 7,20 - 8,00 |                                               |
| Magnesium : Calcium Mg/Ca                                          | 2.99             | 2,70 - 3,20 - 3,60 |                                               |
| Calcium : Strontium Ca/Sr                                          | 46.4             | 44,0 - 53,0 - 68,0 |                                               |
| Bromide : Fluoride Br <sup>-</sup> /F <sup>-</sup>                 | 125.8            | 34,0 - 52,0 - 83,0 | <p>— optimum line      — relational value</p> |
| Fluoride : Iodine F <sup>-</sup> /I                                | 2.7              | 11,0 - 20,0 - 29,0 |                                               |

## Macronutrients Nutrients

in mg/Litre (1 mg = 0,001 g)

|                               |                                               | measured | reference range |   |      |
|-------------------------------|-----------------------------------------------|----------|-----------------|---|------|
| Nitrate                       | NO <sub>3</sub> <sup>-</sup>                  | 3.5      | 1,00            | - | 10,0 |
| Nitrite                       | NO <sub>2</sub> <sup>-</sup>                  | 0.03     | < 0,20          |   |      |
| Phosphorus (ICP-OES)          | P                                             | 0.003    | < 0,06          |   |      |
| Total Phosphate (calculated)  | PO <sub>4</sub> <sup>3-</sup> <sub>tot.</sub> | 0.01     | 0,02            | - | 0,18 |
| Ortho-Phosphate (photometric) | PO <sub>4</sub> <sup>3-</sup>                 | 0.02     | 0,02            | - | 0,10 |
| Silicon                       | Si                                            | 0.3      | 0,10            | - | 0,20 |
| Silicate (calculated)         | SiO <sub>2</sub>                              | 0.65     | 0,20            | - | 0,40 |



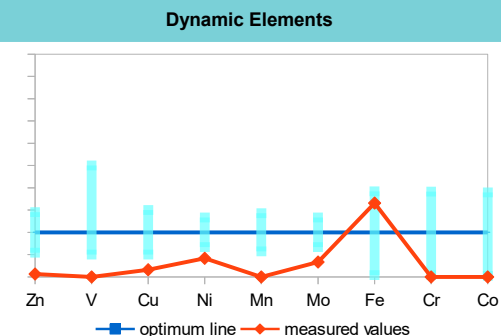
### Relational values

|                                   |      |        |   |      |
|-----------------------------------|------|--------|---|------|
| Total Phosphate : Nitrate         | 384  | 90     | - | 110  |
| Total Phosphate : Ortho-Phosphate | 0.42 | ~ 1,00 |   |      |
| Total Phosphate : Iodine          | 0.03 | 0,13   | - | 1,67 |

## Physiologically relevant trace elements and color-relevant micronutrients

in µg/Litre (1 µg = 0,000001 g)

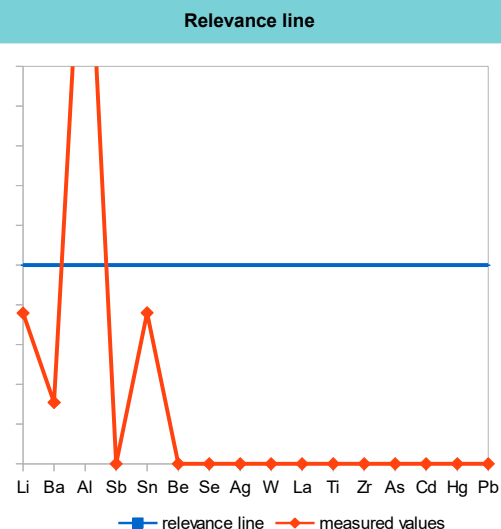
|            |    | measured | reference range |   |      |
|------------|----|----------|-----------------|---|------|
| Zinc       | Zn | 0.36     | 3,00            | - | 8,00 |
| Vanadium   | V  | n.n.     | 2,00            | - | 10,0 |
| Copper     | Cu | 0.64     | 2,00            | - | 6,00 |
| Nickel     | Ni | 1.89     | 3,00            | - | 6,00 |
| Manganese  | Mn | n.n.     | 0,10            | - | 0,25 |
| Molybdenum | Mo | 5        | 10,0            | - | 20,0 |
| Iron       | Fe | 2.15     | 0,05            | - | 2,50 |
| Chrome     | Cr | n.n.     | 0,05            | - | 2,30 |
| Cobalt     | Co | n.n.     | 0,02            | - | 1,90 |



## Other trace elements and potential harmful substances

in µg/Litre (1 µg = 0,000001 g)

|           |    | measured | reference range |   |      |
|-----------|----|----------|-----------------|---|------|
| Lithium   | Li | 379      | 180             | - | 350  |
| Barium    | Ba | 61.8     | 5,00            | - | 50,0 |
| Aluminium | Al | 94.1     | 5,00            | - | 30,0 |
| Antimony  | Sb | n.n.     | < 10,0          |   |      |
| Tin       | Sn | 7.6      | < 10,0          |   |      |
| Beryllium | Be | n.n.     | 0,05            | - | 1,40 |
| Selenium  | Se | n.n.     | 0,90            | - | 5,50 |
| Silver    | Ag | n.n.     | < 10,0          |   |      |
| Tungsten  | W  | n.n.     | < 30,0          |   |      |
| Lanthanum | La | n.n.     | 2,00            | - | 10,0 |
| Titanium  | Ti | n.n.     | 0,50            | - | 3,50 |
| Zirconium | Zr | n.n.     | 1,00            | - | 2,20 |
| Arsenic   | As | n.n.     | < 1,00          |   |      |
| Cadmium   | Cd | n.n.     | < 1,00          |   |      |
| Mercury   | Hg | n.n.     | < 1,00          |   |      |
| Lead      | Pb | n.n.     | < 1,00          |   |      |



### Osmosis water

|                              |                                               | measured | reference range |
|------------------------------|-----------------------------------------------|----------|-----------------|
| Calcium                      | Ca                                            | n.n.     | n.n.            |
| Potassium                    | K                                             | 0.51     | n.n.            |
| Magnesium                    | Mg                                            | 0.56     | n.n.            |
| Sodium                       | Na                                            | 2.23     | n.n.            |
| Sulphur                      | S                                             | n.n.     | n.n.            |
| Phosphorus (ICP-OES)         | P                                             | n.n.     | n.n.            |
| Total Phosphate (calculated) | PO <sub>4</sub> <sup>3-</sup> <sub>tot.</sub> | n.n.     | n.n.            |
| Silicon                      | Si                                            | n.n.     | n.n.            |
| Silicate (calculated)        | SiO <sub>2</sub>                              | n.n.     | n.n.            |

### in µg/Litre (1 µg = 0,000001 g)

|           |    |      |      |
|-----------|----|------|------|
| Aluminium | Al | n.n. | n.n. |
| Lead      | Pb | n.n. | n.n. |
| Cadmium   | Cd | n.n. | n.n. |
| Chrome    | Cr | n.n. | n.n. |
| Iron      | Fe | n.n. | n.n. |
| Copper    | Cu | n.n. | n.n. |
| Lithium   | Li | n.n. | n.n. |
| Nickel    | Ni | n.n. | n.n. |
| Mercury   | Hg | n.n. | n.n. |
| Tin       | Sn | n.n. | n.n. |
| Zinc      | Zn | n.n. | n.n. |

Measured values of type "> 24" indicate that the concentration is above the calibrated range and therefore cannot be determined definitively. In these cases it is indicated how much at least is present (e.g. 24 µg/l). Abbreviations: n.g. (not measured), n.n. (not detectable).