REEF ICP **TOTAL**

METHODOLOGY: ICP-OES, photometric and electrochemical methods specific to seawater.

Recommended values are optimized for coral reef aquariums.

Sample ID:	**20457792**
Analysis ID:	**166111**
Sample Type:	Seawater
Volume in Liters:	600
Sampling Point:	Peninsula Style
Sampling Date:	09-30-2024
Sample Arrival:	10-04-2024

To the dosing and action recommendations

PHYSICAL-CHEMICAL BASIC VALUES

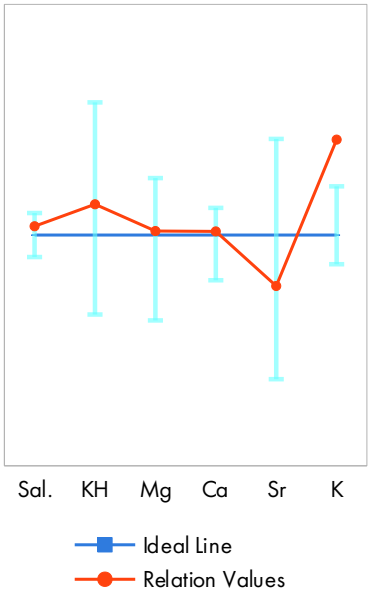
	measured	Reference Range	
Electrical Conductivity (mS/cm 25°C)	**53.7**	51,7 - **53,0** - 54,5	
Density (kg/Liter, calculated 25°C)	**1.024**	1,022 - **1,023** - 1,024	
Relative Density (calculated 25°C)	**1.027**	1,026 - 1,027	
Salinity (psu, calculated)	**35.4**	34 - **35** - 36	Apex 34.9 / Optical 36 / Refractor 34.9
pH Value	**7.92**	7,9 - **8,3** - 8,4	Apex 7.8 / Alkatronic 7.76
Carbonate Hardness (°dKH)	**7.8**	6,5 - **7,3** - 8,5	Alkatronic 8.17 / Hanna 8.1
CO2 Content (mg/l)	**2.72**	0,04 - 2,5	
Alkalinity pH 4.3 (mmol/L)	**2.78**	2,3 - **2,58** - 3,0	
Smell	**none**	none	
Color	**none**	colorless	

MACROELEMENTS, CALCIUM BALANCE ELEMENTS, AND HALOGENS in mg/Liter

		measured	Reference Range	rel. 35 psu	
Sodium	Na	**11363**	9500 - **10700** - 11500	**11223**	
Sulfur	S	**876**	850 - **900** - 950	**865**	
Sulfate	SO_4^{2-}	**2624**	2550 - **2700** - 2850	**2592**	
Potassium	K	**444**	380 - **395** - 420	**439**	
Boron	B	**6.14**	3,8 - **4,5** - 5,5	**6.06**	
Magnesium Salifert 1320-1350 mg/l	Mg	**1357**	1200 - **1350** - 1450	**1340**	
Calcium Salifert 430 mg/l	Ca	**427**	400 - **425** - 440	**422**	
Strontium	Sr	**7.47**	6,5 - **8,0** - 9,0	**7.38**	Dosed 5ml/daily
Chloride	Cl^-	**19615**	18700 - **19500** - 20300	**19374**	
Bromine (total bromine, ICP-OES)	Br	**78.3**	55 - **67** - 75	**77.3**	
Fluoride	F^-	**0.71**	0,9 - **1,3** - 1,6	**0.7**	Dosed 3ml/daily
Iodine (Total Iodine, ICP-OES)	I	**0.088**	0,055 - **0,065** - 0,080	**0.087**	Dosed 0.03 ml/daily

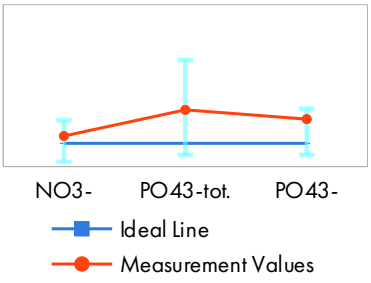
RELATION VALUES OF MACROELEMENTS AND HALOGENS

		measured	Reference Range
Salinity Meas. : Target Value	Sal.	**1.01**	0,97 - 1,00 - 1,03
KH Measurement : Target Value	KH	**1.08**	0,90 - 1,00 - 1,17
Magnesium : Salinity	Mg	**38.3**	33,3 - 38,6 - 42,6
Calcium : Salinity	Ca	**12**	11,1 - 12,1 - 12,9
Strontium: Salinity	Sr	**0.21**	0,18 - 0,23 - 0,26
Potassium : Salinity	K	**12.5**	10,6 - 11,3 - 12,4
Boron : Salinity	B	**0.17**	0,11 - 0,13 - 0,16
Chloride : Salinity	Cl^-	**554**	519 - 557 - 597
Sulfate : Salinity	SO_4^{2-}	**74.1**	71 - 77 - 84
Chloride : Sulfate	Cl^-/SO_4^{2-}	**7.47**	6,6 - 7,2 - 8,0
Magnesium : Calcium	Mg/Ca	**3.18**	2,7 - 3,2 - 3,6
Calcium : Strontium	Ca/Sr	**57.2**	44 - 53 - 68
Bromide : Fluoride	Br^-/F^-	**110.3**	34 - 52 - 83
Fluoride : Iodine	F^-/I	**8.1**	11 - 20 - 29
Fluoride : Sulfur : Strontium	FSS	**73.2**	80 - 100 - 120



MACRO NUTRIENTS in mg/Liter

		measured	Reference Range
Nitrate	NO_3^-	**6.6** Hanna 7.4 mg/l	1 - 10
Nitrite	NO_2^-	**0.06**	**< 0,20**
Phosphorus (ICP-OES)	P	**0.032**	**< 0,06**
Total Phosphate (calculated)	$PO_4^{3-}{}_{tot.}$	**0.098**	0,02 - 0,18
ortho-Phosphate (photometric)	PO_4^{3-}	**0.082**	0,02 - 0,10
Silicon	Si	**0.08**	0,1 - 0,2
Silicate (calculated)	SiO_2	**0.18**	0,2 - 0,4



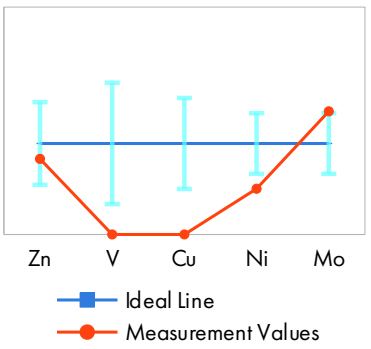
ORGANIC FACTORS

		measured	Reference Range
Total Phosphate : Nitrate	$PO_4^{3-}{}_{tot.}/NO_3^-$	**67.07**	90 - 110
Total Phosphate : ortho-Phosphate	$PO_4^{3-}{}_{tot.}/PO_4^{3-}$	**1.195**	**1,00**
Total Phosphate : Iodine	$PO_4^{3-}{}_{tot.}/I$	**1.11**	0,13 - 1,67
SAK254 (m^{-1})		**n.m.**	0,5 - 5,0

Interested? Then get this value as an upgrade for your next analysis and find out even more about your tank!

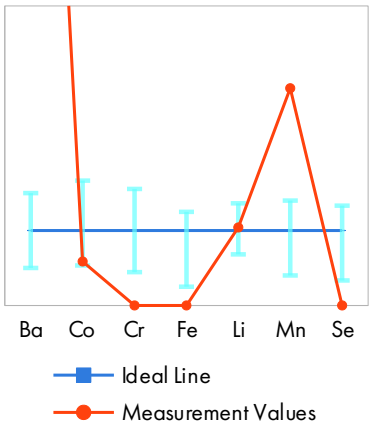
Dynamic Elements in µg/Liter

			measured	Reference Range
Zinc		Zn	**4.57**	3 - 5,5 - 8
Vanadium	Dosed 0.3 ml/daily	V	**n.d.**	2 - 6 - 10
Copper		Cu	**n.d.**	2 - 4 - 6
Nickel		Ni	**2.26**	3 - 4,5 - 6
Molybdenum		Mo	**20.3**	10 - 15 - 20



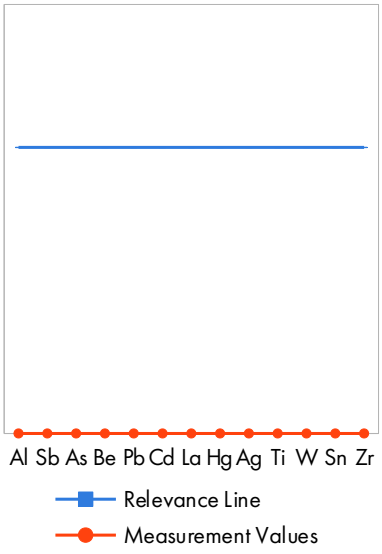
PHYSIOLOGICALLY RELEVANT TRACE ELEMENTS in µg/Liter

			measured	Reference Range		
						Max.
Barium	Correction from last icp	Ba	**134**	5	-	50
Cobalt		Co	**0.88**	n.d.	-	1,9
Chromium	Dosed 0.15 ml/daily	Cr	**n.d.**	n.d.	-	2,3
Iron	Dosed 1.5 ml/daily	Fe	**n.d.**	n.d.	-	2,5
Lithium		Li	**229**	180	-	350
Manganese		Mn	**0.29**	n.d.	-	0,25
Selenium	Dosed 0.3 ml/daily	Se	**n.d.**	n.d.	-	2,0



OTHER TRACE ELEMENTS AND POTENTIAL POLLUTANTS in µg/Liter

		measured	Reference Range		
Aluminum	Al	**n.d.**	5	-	30
Antimony	Sb	**n.d.**	n.d.	- (max.)	10
Arsenic	As	**n.d.**		**n.d.**	
Beryllium	Be	**n.d.**		**n.d.**	
Lead	Pb	**n.d.**		**n.d.**	
Cadmium	Cd	**n.d.**		**n.d.**	
Lanthanum	La	**n.d.**	2	-	10
Mercury	Hg	**n.d.**		**n.d.**	
Silver	Ag	**n.d.**	n.d.	- (max.)	10
Titanium	Ti	**n.d.**	n.d.	-	3,5
Tungsten	W	**n.d.**	n.d.	- (max.)	30
Tin	Sn	**n.d.**	n.d.	- (max.)	10
Zirconium	Zr	**n.d.**	n.d.	-	2,2



OSMOSIS WATER

in mg/Liter		measured	Reference Range
Calcium	Ca	**n.d.**	**n.d.**
Potassium	K	**n.d.**	**n.d.**
Magnesium	Mg	**n.d.**	**n.d.**
Sodium	Na	**n.d.**	**n.d.**
Sulfur	S	**n.d.**	**n.d.**
Bromine (total bromine, ICP-OES)	Br	**n.d.**	**n.d.**
Iodine (Total Iodine, ICP-OES)	I	**n.d.**	**n.d.**
Phosphorus (ICP-OES)	P	**n.d.**	**n.d.**
Total Phosphate (calculated)	$PO_4^{3-}{}_{tot.}$	**n.d.**	**n.d.**
Silicon	Si	**0**	**n.d.**
Silicate (calculated)	SiO_2	**0.01**	**n.d.**
in µg/Liter			
Aluminum	Al	**n.d.**	**n.d.**
Antimony	Sb	**n.d.**	**n.d.**
Arsenic	As	**n.d.**	**n.d.**
Barium	Ba	**n.d.**	**n.d.**
Beryllium	Be	**n.d.**	**n.d.**
Lead	Pb	**n.d.**	**n.d.**
Boron	B	**n.d.**	**n.d.**
Cadmium	Cd	**n.d.**	**n.d.**
Chromium	Cr	**n.d.**	**n.d.**
Cobalt	Co	**n.d.**	**n.d.**
Iron	Fe	**n.d.**	**n.d.**
Copper	Cu	**n.d.**	**n.d.**
Lanthanum	La	**n.d.**	**n.d.**
Lithium	Li	**n.d.**	**n.d.**
Manganese	Mn	**n.d.**	**n.d.**
Molybdenum	Mo	**n.d.**	**n.d.**
Nickel	Ni	**n.d.**	**n.d.**
Mercury	Hg	**n.d.**	**n.d.**
Selenium	Se	**n.d.**	**n.d.**
Silver	Ag	**n.d.**	**n.d.**
Strontium	Sr	**n.d.**	**n.d.**
Titanium	Ti	**n.d.**	**n.d.**
Thallium	Tl	**n.d.**	**n.d.**
Vanadium	V	**n.d.**	**n.d.**
Tungsten	W	**n.d.**	**n.d.**
Tin	Sn	**n.d.**	**n.d.**
Zinc	Zn	**n.d.**	**n.d.**
Zirconium	Zr	**n.d.**	**n.d.**

Abbreviations: ICP-OES (inductively coupled plasma with optical emission spectrometry), SAK254 (spectral absorption coefficient at 254 nm), n.m. (not measured), n.d. (not detectable).