REEF ICP **TOTAL**

Methodology: ICP-OES, photometric and electrochemical methods specific for seawater. Further methods possible via upgrades.

Recommended values are optimized for coral reef aquariums.

Sample ID:	**20270278**
Analysis ID:	**236340**
Booked upgrades:	**non**
Sampling Point:	Redsea 425 G2
Volume in Liters:	425
Sampling Date:	07-30-2025
Sample Arrival:	08-08-2025

To the dosing and action recommendations

PHYSICAL-CHEMICAL BASIC VALUES

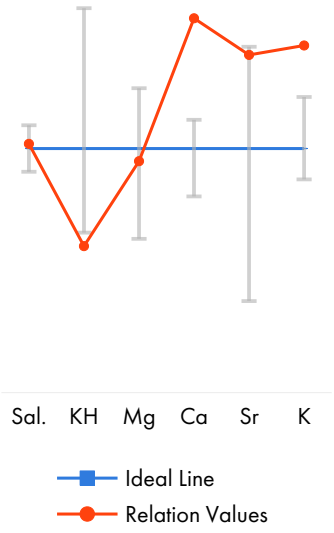
	measured	Reference Range
Electrical Conductivity (mS/cm 25°C)	**53,4**	51,7 - **53,0** - 54,5
Density (kg/Liter, calculated 25°C)	**1,024**	1,022 - **1,023** - 1,024
Relative Density (calculated 25°C)	**1,027**	1,026 - 1,027
Salinity (psu, calculated)	**35,2**	34 - **35** - 36
pH Value	**8**	7,9 - **8,3** - 8,4
Carbonate Hardness (°dKH)	**6,6**	6,5 - **7,3** - 8,5
CO2 Content (mg/l)	**1,92**	0,04 - 2,5
Alkalinity pH 4.3 (mmol/L)	**2,36**	2,3 - **2,58** - 3,0
Smell	**none**	none
Color	**none**	colorless

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

			measured	Reference Range	rel. 35 psu
Sodium	Na		**11363**	9500 - **10700** - 11500	**11294**
Sulfur	S		**856**	850 - **900** - 950	**851**
Sulfate	SO_4^{2-}		**2565**	2550 - **2700** - 2850	**2549**
Potassium	K		**445**	380 - **395** - 420	**442**
Boron	B		**5,56**	3,8 - **4,5** - 5,5	**5,53**
Magnesium	Mg		**1329**	1200 - **1350** - 1450	**1321**
Calcium	Ca		**493**	400 - **425** - 440	**490**
Strontium	Sr		**8,92**	6,5 - **8,0** - 9,0	**8,87**
Chloride	Cl^-		**19402**	18700 - **19500** - 20300	**19284**
Bromine (total bromine, ICP-OES)	Br		**73,4**	55 - **67** - 75	**73**
Fluoride	F^-		**0,76**	0,9 - **1,3** - 1,6	**0,76**
Iodine (Total Iodine, ICP-OES)	I	*	**0,169**	0,055 - **0,065** - 0,080	**0,168**

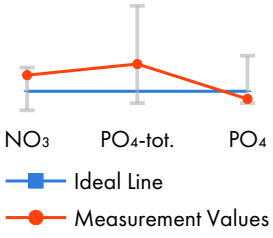
RELATION VALUES OF MACROELEMENTS AND HALOGENS

		measured	Reference Range
Salinity Meas. : Target Value	Sal.	**1,01**	0,97 - **1,00** - 1,03
KH Measurement : Target Value	KH	**0,91**	0,90 - **1,00** - 1,17
Magnesium : Salinity	Mg	**37,7**	33,3 - **38,6** - 42,6
Calcium : Salinity	Ca	**14**	11,1 - **12,1** - 12,9
Strontium: Salinity	Sr	**0,25**	0,18 - **0,23** - 0,26
Potassium : Salinity	K	**12,6**	10,6 - **11,3** - 12,4
Boron : Salinity	B	**0,16**	0,11 - **0,13** - 0,16
Chloride : Salinity	Cl^-	**551**	519 - **557** - 597
Sulfate : Salinity	SO_4^{2-}	**72,8**	71 - **77** - 84
Chloride : Sulfate	Cl^-/SO_4^{2-}	**7,57**	6,6 - **7,2** - 8,0
Magnesium : Calcium	Mg/Ca	**2,7**	2,7 - **3,2** - 3,6
Calcium : Strontium	Ca/Sr	**55,3**	44 - **53** - 68
Bromide : Fluoride	Br^-/F^-	**96,6**	34 - **52** - 83
Fluoride : Iodine	F^-/I	**4,5**	11 - **20** - 29
Fluoride : Sulfur : Strontium	FSS	**79,1**	80 - **100** - 120



MACRO NUTRIENTS in mg/Liter

		measured	Reference Range
Nitrate	NO_3^-	**8,4**	1 - 10
Nitrite	NO_2^-	**0,09**	n.d. - 0,15
Phosphorus (ICP-OES)	P	**0,028**	0,006 - 0,060
Total Phosphate (calculated)	$PO_4^{3-}{}_{tot.}$	**0,086**	0,02 - 0,18
ortho-Phosphate (photometric)	PO_4^{3-}	**0,027**	0,02 - 0,10
Silicon	Si	**0,1**	0,1 - 0,2
Silicate (calculated)	SiO_2	**0,21**	0,2 - 0,4

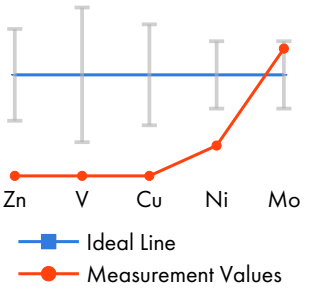


ORGANIC FACTORS

		measured	Reference Range	
Total Phosphate : Nitrate	$PO_4^{3-}{}_{tot.}/NO_3^-$	**98,78**	90 - 110	
Total Phosphate : ortho-Phosphate	$PO_4^{3-}{}_{tot.}/PO_4^{3-}$	**3,185**	**1,00**	
Total Phosphate : Iodine	$PO_4^{3-}{}_{tot.}/I$	**0,51**	0,13 - 1,67	
SAK254 (m^{-1})		**not measured**		only with SAK254 upgrade
NPOC (mg/l)	C	**not measured**		only with organic upgrade
TNb (mg/l)	N	**not measured**		only with organic upgrade

Dynamic Elements in µg/Liter

		measured	Reference Range
Zinc	Zn	**n.d.**	3 - 5,5 - 8
Vanadium	V	**n.d.**	2 - 6 - 10
Copper	Cu	**n.d.**	2 - 4 - 6
Nickel	Ni	**1,35**	3 - 4,5 - 6
Molybdenum	Mo	**18,9**	10 - 15 - 20

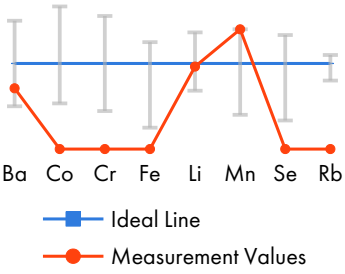


PHYSIOLOGICALLY RELEVANT TRACE ELEMENTS in µg/Liter

		measured	Reference Range
Barium	Ba	**7,1**	5 - max. 50
Cobalt	Co	**n.d.**	n.d. - max. 1,9
Chromium	Cr	**n.d.**	n.d. - max. 2,3
Iron	Fe	**n.d.**	n.d. - max. 2,5
Lithium	Li	**212**	180 - max. 350
Manganese	Mn	**0,14**	n.d. - max. 0,25
Selenium	Se	**n.d.**	n.d. - max. 2,0

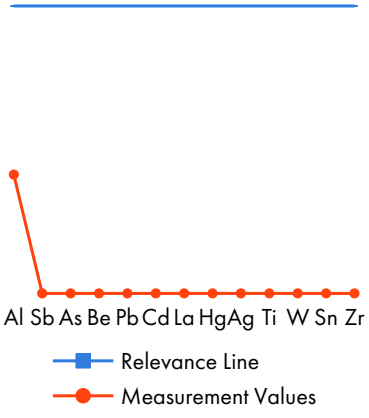
only with ICP-MS upgrade:

Rubidium	Rb	**not measured**



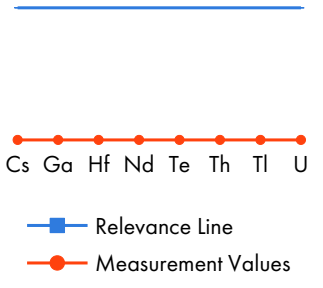
OTHER TRACE ELEMENTS AND POTENTIAL POLLUTANTS in µg/Liter

		measured	Reference Range
Aluminum	Al	**12,4**	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



only with ICP-MS upgrade:

Cesium	Cs	**not measured**
Gallium	Ga	**not measured**
Hafnium	Hf	**not measured**
Neodymium	Nd	**not measured**
Tellurium	Te	**not measured**
Thorium	Th	**not measured**
Thallium	Tl	**not measured**
Uranium	U	**not measured**



OSMOSIS WATER

in mg/Liter		measured	Reference Range
Boron	B	**0,12**	**n.d.**
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	**0,02**	**n.d.**
Silicate (calculated)	SiO_2	**0,05**	**n.d.**
in µg/Liter			
Barium	Ba	**n.d.**	**n.d.**
Copper	Cu	**n.d.**	**n.d.**
Iron	Fe	**n.d.**	**n.d.**
Lithium	Li	**n.d.**	**n.d.**
Nickel	Ni	**n.d.**	**n.d.**
Zinc	Zn	**n.d.**	**n.d.**
Aluminum	Al	**n.d.**	**n.d.**
Antimony	Sb	**n.d.**	**n.d.**
Arsenic	As	**n.d.**	**n.d.**
Beryllium	Be	**n.d.**	**n.d.**
Lead	Pb	**n.d.**	**n.d.**
Cadmium	Cd	**n.d.**	**n.d.**
Chromium	Cr	**n.d.**	**n.d.**
Cobalt	Co	**n.d.**	**n.d.**
Lanthanum	La	**n.d.**	**n.d.**
Manganese	Mn	**n.d.**	**n.d.**
Molybdenum	Mo	**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.**
Zirconium	Zr	**n.d.**	**n.d.**

Overview of dosages

Product	Total quantity	spread over ...	corresponds	Priority	Checkbox
SALINITY	no need for action				
ELEMENTALS S	No dosage				
ELEMENTALS K	Water change			1	
ELEMENTALS B	Water change			1	
ELEMENTALS MG	No dosage				
ELEMENTALS SR	No dosage				
ELEMENTALS BR	No dosage				
ELEMENTALS F	114,8 ml	2 days	57,4 ml/day	2	☐☐
TRACE I	No dosage				
ELEMENTALS P	No dosage				
TRACE ZN	2,3 ml	2 days	1,2 ml/day	3	☐☐
TRACE V	5,1 ml	3 days	1,7 ml/day	3	☐☐☐
TRACE CU	17,0 ml	2 days	8,5 ml/day	3	☐☐
TRACE NI	3,3 ml	1 day	3,3 ml/day	3	☐
TRACE MO	No dosage				
TRACE BA	No dosage				
TRACE CO	1,1 ml	1 day	1,1 ml/day	4	☐
TRACE CR	10,0 ml	3 days	3,3 ml/day	4	☐☐☐
TRACE FE	1,6 ml	2 days	0,8 ml/day	4	☐☐
TRACE LI	No dosage				
TRACE MN	No dosage				
TRACE SE	27,2 ml	4 days	6,8 ml/day	4	☐☐☐☐
TRACE RB	No dosage				

Upgrade options for a Reef ICP Total:

ICP-MS upgrade: Analysis of all trace elements (except aluminum and lithium) by ICP-MS with up to 1000x higher sensitivity compared to ICP-OES and analysis of exclusive elements. ICP-MS exclusive elements cannot be determined by ICP-OES, or not with sufficient sensitivity.

Organic upgrade: Determination of the concentrations of organic carbon (NPOC) and total nitrogen (TNb).

SAK254 upgrade: Determination of the indicator value for the concentration of unsaturated organic compounds.

Detection limits

Time-averaged detection limits for all relevant values are published regularly on lab.faunamarin.de.

Abbreviations:

ICP-OES (inductively coupled plasma with optical emission spectrometry), ICP-MS (inductively coupled plasma with mass spectrometry), SAK254 (spectral absorption coefficient at 254 nm), NPOC (not easily expelled organic carbon), TNb (total bound nitrogen), n.d. (not detectable).

* Measured value is too far outside the calibration range and cannot be precisely determined.