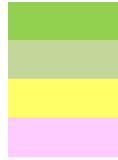


**color codes**

dose these if nothing else  
recommended to dose  
experimental to dose  
Not recommended to dose



Element	Symbol	Atomic Number	Approximate weight concentration*	Dosing Advice
Lithium	Li	3	174 µg/L	No. No known biological role
Beryllium	Be	4	270 pg/L	No. No known biological role
Boron	B	5	4.5 mg/L	May be worth supplementing if substantially low
Carbon	C	6	30 mg/L	Yes, as alkalinity
Nitrogen	N	7	630 µg/l	Yes, maintaining at least 2 ppm nitrate
Fluorine	F	9	1.3 mg/L	May be worthwhile, but dosing should be considered experimental
Sodium	Na	11	10.8 g/L	Controlled by salinity
Magnesium	Mg	12	1.29 g/L	Yes
Aluminum	Al	13	1.1 µg/L	No. No known biological role
Silicon	Si	14	5 mg/L	Yes, for sponges, and diatoms
Phosphorous	P	15	99 µg/L	yes, maintaining at least 0.02 ppm phosphate
Sulfur	S	16	900 mg/L	Controlled by salinity
Chlorine	Cl	17	19.4 g/L	Controlled by salinity
Potassium	K	19	398 mg/L	Yes. Maintain close to 400 ppm
Calcium	Ca	20	412 mg/L	Yes. Maintain 400-550 ppm
Scandium	Sc	21	900 pg/L	No. No known biological role
Titanium	Ti	22	150 pg/L	No. No known biological role
Vanadium	V	23	1.8 µg/L	Yes, critical for many enzymes
Chromium	Cr	24	260 ng/L	Yes
Manganese	Mn	25	165 ng/L	Yes. Rapidly depleted and essential
Iron	Fe	26	140 ng/L	Yes. Rapidly depleted and essential
Cobalt	Co	27	6 ng/L	yes
Nickel	Ni	28	700 ng/L	Yes, critical for many enzymes
Copper	Cu	29	380 ng/L	Yes, critical for many enzymes
Zinc	Zn	30	590 ng/L	Yes, critical for many enzymes
Gallium	Ga	31	2 ng/L	No. No known biological role

Arsenic	As	33	1.8 µg/L	May be worthwhile, but dosing should be considered experimental
Selenium	Se	34	180 ng/L	yes
Bromine	Br	35	67 mg/L	yes
Rubidium	Rb	37	120 µg/L	No. No known biological role
Strontium	Sr	38	7.9 mg/L	May be worth supplementing if substantially low
Yttrium	Y	39	1.3 µg/L	No. No known biological role
Zirconium	Zr	40	27 ng/L	No. No known biological role
Niobium	Nb	41	4.7 ng/L	No. No known biological role
Molybdenum	Mo	42	10.5 µg/L	Yes, critical for many enzymes
Ruthenium	Ru	44	<5 pg/L	No. No known biological role
Palladium	Pd	46	21 pg/L	No. No known biological role
Silver	Ag	47	3.8 ng/L	No. No known biological role
Cadmium	Cd	48	124 ng/L	No. No known biological role
Indium	In	49	115 pg/L	No. No known biological role
Tin	Sn	50	1.4 ng/L	May be worthwhile, but dosing should be considered VERY experimental
Antimony	Sb	51	146 ng/L	No. No known biological role
Iodine	I	53	64 µg/L	May be worth supplementing if substantially low
Cesium	Cs	55	290 ng/L	No. No known biological role
Barium	Ba	56	21 µg/L	No. No known biological role
Lanthanum	La	57	5.1 ng/L	No. No known biological role
Cerium	Ce	58	3.6 ng/L	No. No known biological role
Praseodymium	Pr	59	560 pg/L	No. No known biological role
Neodymium	Nd	60	3.6 ng/L	No. No known biological role
Samarium	Sm	62	750 pg/L	No. No known biological role
Europium	Eu	63	150 pg/L	No. No known biological role
Gadolinium	Gd	64	1.1 ng/L	No. No known biological role
Terbium	Tb	65	143 pg/L	No. No known biological role
Dysprosium	Dy	66	975 pg/L	No. No known biological role
Holmium	Ho	67	310 pg/L	No. No known biological role
Erbium	Er	68	835 pg/L	No. No known biological role
Thulium	Tm	69	135 pg/L	No. No known biological role
Ytterbium	Yb	70	865 pg/L	No. No known biological role
Lutetium	Lu	71	157 pg/L	No. No known biological role
Tungsten	W	74	92 ng/L	May be worthwhile, but dosing should be considered experimental

Rhenium	Re	75	5.6 pg/L	No. No known biological role
Iridium	Ir	77	1.9 pg/L	No. No known biological role
Platinum	Pt	78	98 pg/L	No. No known biological role
Gold	Au	79	39 pg/L	No. No known biological role
Mercury	Hg	80	2 ng/L	No. No known biological role
Thallium	Tl	81	12 ng/L	No. No known biological role
Lead	Pb	82	36 ng/L	No. No known biological role
Bismuth	Bi	83	50 pg/L	No. No known biological role

\*This concentration represents the high end of the natural range

1 µg/L ~ 1 ppb; 1 ng/L ~ 1 ppt (part per trillion); 1 pg/L ~ 1 ppq (part per quadrillion)