

Reef Moonshiner's Handbook

COMPREHENSIVE USER MANUAL

Contents

Rev.3 ..... ***5***

Copyright and Notice of use ***5***

The Reef Moonshiner's method in a quick overview ***5***

Trace Elements overview and it's importance ***6***

Categories of Trace Elements dosing under the Reef Moonshiner's method **7**

Applying the method ***9***

Perform the ICP Test 10
Compare the Test Results 11
Calculate and perform the Corrections 12
ICP Assessment and Dosing tool 12

Elements and Solutions needed ***15***

Salinity 15
Alkalinity 15
Magnesium (Brightwell Magnesion-P) 15
Calcium (Brightwell Calcion-P) 16
Potassium (Brightwell Potassion-P) 16
Bromine (Reef Moonshiner Element) 16
Strontium (Brightwell Strontion-P) 16
Boron (Reef Moonshiner Element) 16
Fluorine (Reef Moonshiner Element) 17
Iodine/Iodide (Seachem Reef Iodide) 17
Barium (Reef Moonshiner Element) 17
Molybdenum (Reef Moonshiner Element) 18
Nickel (Reef Moonshiner Element) 18
Manganese (Reef Moonshiner Element) 18
Chrome/Chromium (Reef Moonshiner Element) 18
Cobalt (Reef Moonshiner Element) 18
Iron (Reef Moonshiner Element) 18
Silver (Reef Moonshiner Element) 18
Vanadium (Triton) 18
Zinc (Reef Moonshiner Element) 18
Tin (Reef Moonshiner Element) 18
Rubidium (Reef Moonshiner Element) 19
Nitrate (Loudwolf Sodium/Potassium Nitrate) 19
Phospates (Now Spirulina Powder) 19
Special Element – Lithium (ATI) 19
Special Element – Copper (Reef Moonshiner Element) 19

"Classic Elements" versus "NANO/PUMP Elements" ***20***

Classic Elements 20
NANO/PUMP Elements 20

Dosing the Elements ***22***

Weigh the solutions 22
Dosing the "correction" solutions into the system 22
Dosing the "daily" solutions into the system 22
Dosing during vacation or absence 22
Dosing in advance 22
Mixing Elements and Handling 23

Compability with other Trace element Products 23
Compability with Calcium Reactors 23
Compability with other Nutrient reducing methods 23
Safety precautions 24
Relationship to any of the mentioned Brands/Products/Vendors 24

Dosing individual Trace elements 25
Benefits 25
Disadvantages 26

Next steps 27

Reef Moonshiner Dosing Calculator 29
Calculate and perform the Corrections 29
Correction dosages : 30
Daily Elements dosages : 31
Dosing monthly/quarterly - Rubidium 32
Data entry 33
Read out dosing amounts needed 35

Bonus and Troubleshooting 37
Water Change free Tanks 37
Low PH issues in Reef Tanks 43

Self Assessment Sheets 46

Alkalinity / Carbonate hardness 46

Magnesium 46

Sulfur 47

Calcium 47

Potassium 47

Bromine 47

Strontium 47

Boron 48

Fluorine/Fluoride 48

Lithium 48

Silicate 48

Iodine 49

Barium 49

Molybdenum 49

Nickel 49

Manganese 50

Chromium 50

Cobalt 50

Iron 51

Copper 51

Silver **51**
Vanadium **52**
Zinc **52**
Tin / Stannum **52**
Aluminum **52**
Rubidium **53**
Other Pollutants **53**



Reef Moonshiners TM Tank after 24 months of growth, initially filled with IORC salt, first ICP done a week later after first fill. From that point, no Water changes been performed and only Reef Moonshiner method is been applied. Needless to say, this tank needed already a lot of fragmentation already, to keep Corals in shape.

SPS Dominated with multiple specimen of delicate soft corals, Bounces, Torches, Hammer and Zoa, this setup is an example of the possibility that all these Species can be kept in the same Reeftank system without the myth of outcompeting each other, as long the required trace elements are provided.

Credit

At this point I would like to thank all the Reef Moonshiner users out there for their loyality and trust given in this method and relevant products, and a big thank you to everyone who contributed to the success of the Reef Moonshiners method by asking questions, bringing ideas for improvement on the Products and Tools.
Thank you very much, couldn't have done that without you !
-Andre

Rev.3

Copyright and Notice of use

2020 Reef Moonshiners LLC

All rights reserved. No part of this publication may be reproduced, distributed, or transmitted in any form or by any means, including photocopying, recording, or other electronic or mechanical methods, without the prior written permission of the publisher, except in the case of brief quotations embodied in critical reviews and certain other noncommercial uses permitted by copyright law. For permission requests, write or contact the publisher, addressed "Attention: Permissions Coordination" via email or any other given contact information. All described methods and facts as well as information listed are personal opinions based on personal experience, interpretation and education. The Author takes no responsibility or liability for the use and applying the described practices and or methods and Products used and any form of results. Also, the Author confirms personal distance to any recommended or mentioned brands and products and has not received any form of compensation for these products or brands to be mentioned in this publication.

The Reef Moonshiner's method in a quick overview

In a few words, the Moonshiner method is a smart and very easy way to manage the entire Reef Chemistry on a Reef tank in the most effective way that will allow the Reefkeeper to grow nearly any coral since there will be no limitations anymore that would avoid keeping the most difficult Corals when it comes to the required chemistry of the water.

Basically, all important Trace elements, major and minor are individually measured, adjusted and maintained above natural seawater levels. So, there will be no room for questioning if anything may be depleted or missing that may lead to poor coloration or insufficient growth.

The adjustment and corrections on depleted elements are performed after an ICP test.

Also a few Elements are supplemented daily, to take advantage of the daily need of certain elements that usually deplete within a day or two after dosing or water change.

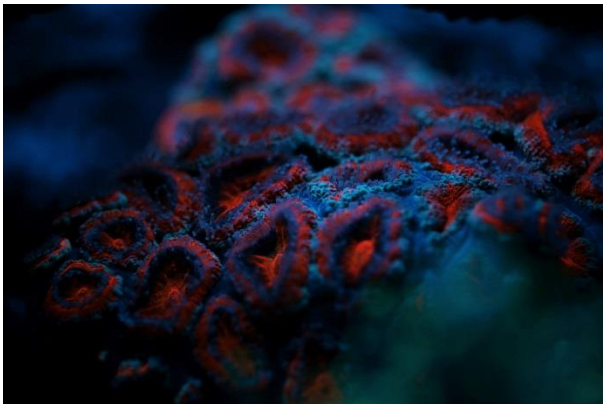
The beauty is that there will be no overdosing possible of any element, since each element is monitored and supplemented individually via a calculation tool that makes the determination how much solution and for how many days it will need to be dosed to achieve the desired level.

As soon the monthly or bimonthly corrections are performed, there is no worry about the chemistry for quite a while, and there is no real need for struggle with Test kits that may or may not correctly indicate Iodine, Potassium, Strontium etc. besides the fact that many minor elements not very significantly change between testing, hence no need for struggle and reading coloring charts not to mention the cost to maintain and keep the test kits.

No limitation on Livestock such as the most sensitive SPS species after the corrections, that require high level maintenance normally. This method brings the tank to highest level standards, without having a Master's degree in Chemistry or Biology!

Results and improvements can take from a few days usually until full effect that normally is seen after the first few months. Also, there is potential to waive water changes, which many users do not perform anymore after applying this method.





Trace Elements overview and it's importance

The below Summary is intended to give a brief overview of the required Trace Elements.

It is no secret anymore that Trace elements have to be maintained in some way to avoid depletion and enhance certain color effects on corals.

However, what most people won't realize is that Trace elements are also very important for a healthy biology since certain bacteria also require trace elements for their metabolism and to maintain a healthy biological diversity.

If certain Trace elements are below a particular range, the entire growth cycle is impacted and not just the coloration. A few elements that can't even be measured with home test kits will cause the entire calcification process to stop and cause other elements such as Calcium, Potassium and Strontium for example to creep up into ranges that they will then bleach corals, makes them more sensitive to light burn or even contribute to Tissue Necrosis (RTN/STN).

In a lot of cases I have seen that simply only Barium in depleted levels, did bring the entire Reef tank to a full stop, causing other elements going out of whack really badly. The Reef Moonshiner's method and elements, will avoid that with ease, and it makes sure that individual elements can't increase into excessive levels.

The Reef Moonshiner's method is designed to manage the entire Reef Chemistry with lowest possible cost for the Reefkeeper and is a mix of Reef Moonshiner Elements as well as common available Products which are recommended to be used and to be mixed and used in line with the Moonshiner Dosing tools for adjustments/corrections.

Categories of Trace Elements dosing under the Reef Moonshiner's method

Dosing Regime is split in 3 simple categories:

- **Daily dosing** - of up to 6 elements (if not detectable on the ICP result)
- **Correction dosages** after ICP - on monthly or bimonthly basis, can be extended

  No other dosing needed in between, if Calcium and Alkalinity is maintained via dosing or Calcium reactor.
- **Daily/Monthly/Quarterly** dose of Rubidium as option, but strongly recommended

Daily Dosing :

These Elements are dosed daily to ensure small amounts of these traces are continuously available for most stability. As default these are only dosed if not detectable on the ICP test results. Dosing of the below daily elements usually takes only a few minutes.

- Iodide
- Manganese
- Cobalt
- Chromium
- Iron
- Vanadium
- Liqui Mud and Vitamin-X as additional options (see Website Product description)

Dosing after ICP (so called Corrections)

These elements are simply going to be corrected back to the recommended target levels if required after each ICP result. Target levels are shown in the Reef Moonshiner calculation tools and the ICP Test self-assessment section in this guide. Use of Calcium reactors usually minimize the need for corrections significantly, depending on the media that is used.

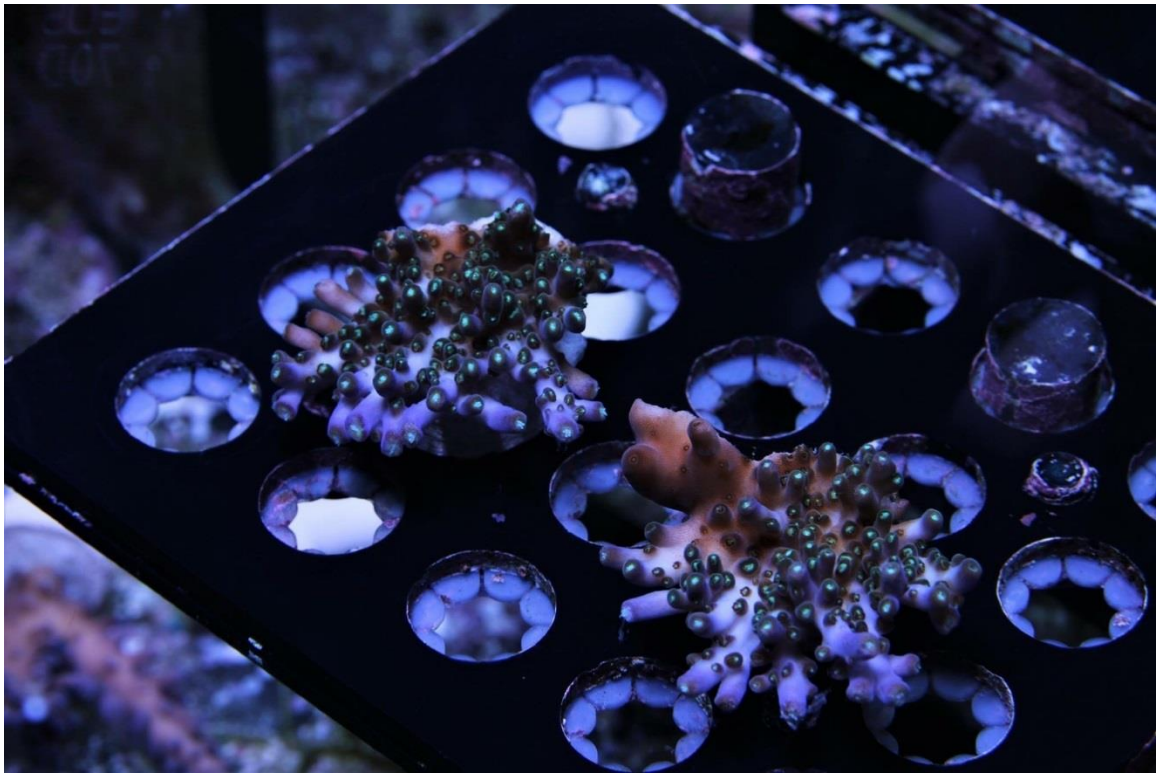
- Calcium
- Magnesium
- Potassium
- Bromine
- Strontium
- Boron
- Fluoride
- Barium
- Molybdenum
- Nickel
- Zinc
- Tin (under evaluation if daily or Corrections dosages are more beneficial)

Dosing monthly/quarterly - Rubidium

Rubidium is a little bit of an exception from the above dosing regime and a correction will be dosed initially to Natural Seawater level, when the method will be started first time, and then subsequent dosed in a smaller maintenance dosage on either a monthly or quarterly basis.

The "ICP Assessment and dosing tool" also advises the daily Rubidium if desired.

Rubidium is not a mandatory element to be dosed in the beginning, however it has shown to be extremely beneficial to mixed reefs that also include Torches, Zoa, and exotic Shrooms and other Soft corals. The experience is from trials is that Bounces and Shrooms and Zoa are reproducing much quicker and more than without the supplementation of Rubidium. Rubidium is usually always going nearly depletion levels in normal tanks, since it is a costly element and barely included in most supplements and Salt mixes.



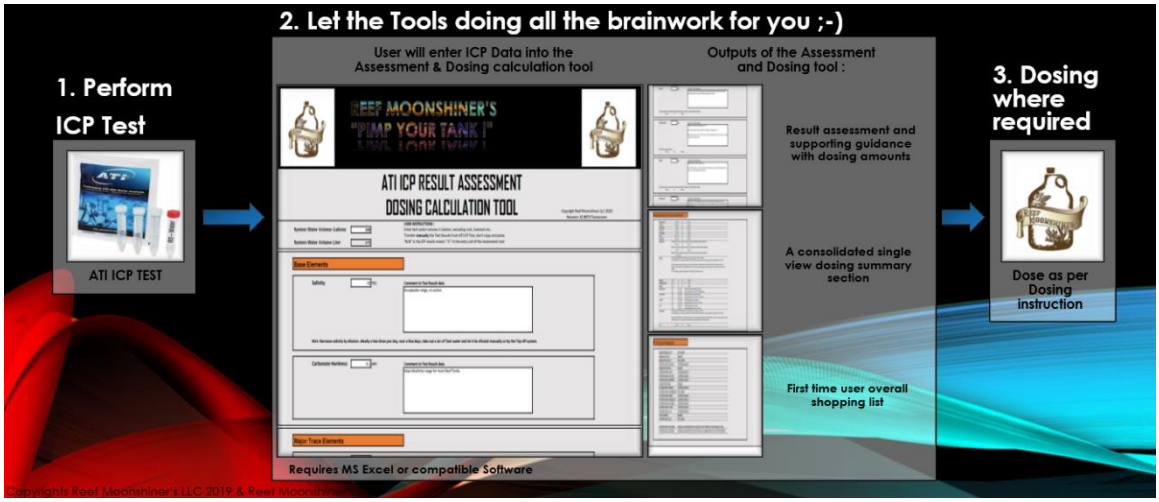
Applying the method

Applying the method is actually very easy. There are free digital tools available which will fit beginner and Pro Reefkeeper.

1. Perform the ICP Test (ATI ICP Test required)
2. Enter the Tank Volume and Test Results into the automated "ICP Assessment and dosing tool" and let the tool doing all the calculations for you fully automated to the Moonshiner target levels!

   or

   Compare the results of the test versus the required Moonshiner Targets at the end of this Handbook and manually run the Calculations through the Reef Moonshiner Calculator.
3. Perform the corrections as needed with the elements in accordance to the tool you chose. Simply speaking, create the needed saltwater mix we want for our corals!
4. Dose the daily elements as instructed by the "ICP Assessment and dosing tool" which advises to dose these daily elements that were not detected on the ICP test. See the Section "Dosing the Elements" in this Handbook to learn some useful hints and tricks for dosing the elements and handling and storing the products.



The following sections in this Handbook will describe in more detail the functions of the Digital tools the Reef Moonshiner system uses.

- ICP Assessment and dosing tool (Automated to Target levels)
- Reef Moonshiner Calculator (Semi Automated Calculator for Reef Moonshiner and supported Products to allow individual dosing to preferred target levels)

Be aware, the Digital Tools are MS Excel based, and may or may not be compatible to Non MS Excel software. Please test the tools prior purchasing the products.

In many cases where compatibility problems did arise, Google-Sheets was successful used as alternative. Be aware that the Excel sheets can't be edited on most mobile devices, hence they won't work on phones and such.

Perform the ICP Test

First step is to determine the Trace elements parameter with the ATI ICP test. Simply buy the Test kit online or at your local store. Follow the instructions on the test that you receive, to set up the account at the first time.

The ATI Test kit has been chosen on purpose and the tools have been worked around this test.

This particular brand ICP will test your RODI water which in a lot of cases indicates exhausted Resin even prior the TDS meter shows the first signs of solids going through the RODI system. Very common is that it is showing that silicates are coming through the top off water which contribute to Dino and Algae issues.

As well this test, which is the main reason to use it, will test for Fluoride which is an extremely important and effective trace element in the Reef tank.

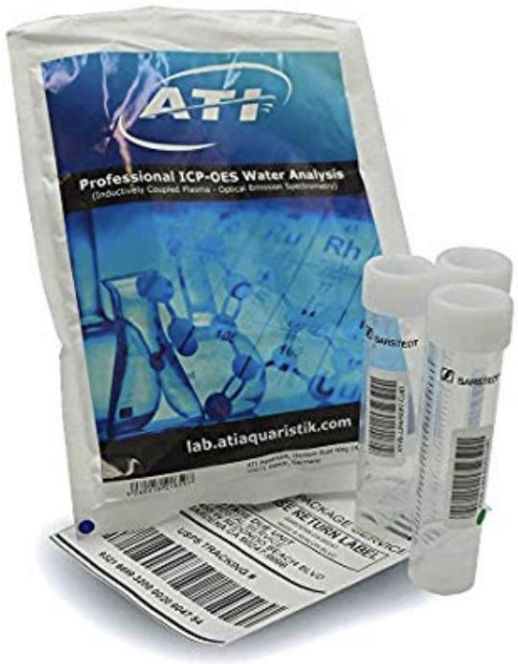
Last, but not least, it already includes a pre-paid return label, so you won't have to go to the Post office during business hours and stand in line. Simply place it into the package slot/box at the Post office or use your own mailbox to get it out.

I have used other Laboratories and with ATI test, I have the best results overall. Unfortunately, the turnaround time may range from a 1,5 weeks to 3 weeks until you get the results, but mostly 2 weeks.

The ATI user interface and database keeps track of all results and the user can unlock all elements to be shown in graphs and curves, customized to show the element trending over time.

The sample shall be taken 2 days at least after the last water change, and prior the daily doses if you already do the daily elements dosages.

It is a good time then to compare the own test kits occasionally with the reading from the lab.



Don't panic if they are off a bit, like everything in science, all tests are subject to some tolerance. However, I have seen Reefer using cheap expired test kits with Nitrate at 0, while the reality was very high measured.

The Digital tools are sequenced in the same way the test results are shown, avoiding searching during comparison and data entry.

As well there is no need to convert any units between ppm/ppb or mg/L to microgram/L !!!

Major Traces are shown in mg/L (basically PPM) and Minor Trace elements are reflected in microgram/L (basically PPB).

So please do not ask to use another ICP test which may be US based or cheaper, there is a lot more of reasons why the ATI ICP test is chosen.

The Test kit is usually also available on Amazon a lot of times.

Compare the Test Results

As soon the email with the Test results have been received, the second column in the result table does show your measured parameter of the sample you sent in.



Potassium	423.7 mg/l	406.3 mg/l
Bromine	95.30 mg/l	66.72 mg/l
Strontium	10.42 mg/l	7.97 mg/l
Boron	6.27 mg/l	4.38 mg/l
Fluorine	1.48 mg/l	1.29 mg/l
Minor elements		
Lithium	416.3 µg/l	169.3 µg/l
Silicon	108.2 µg/l	99.58 µg/l
Iodine	68.33 µg/l	64.73 µg/l
Barium	40.73 µg/l	9.96 µg/l
Molybdenum	1.74 µg/l	11.95 µg/l
Nickel	u.	0.50 µg/l
Manganese	u.	1.00 µg/l
Arsenic	u.	1.49 µg/l
Beryllium	u.	0.10 µg/l
Chrome	u.	0.50 µg/l
Cobalt	u.	0.10 µg/l

This gives an accurate overview of what elements are missing, low, excessive and potential clarity of undesired pollutants which may exist in the tank and do avoid vibrant colors or growth.

To identify what is required to be dosed and to be brought over into the Dosing calculator, there is a self-assessment section in this guideline showing the target levels we should achieve with the correction dosages.

This self-assessment section also gives advise what to do in case the measured levels are lower or higher a certain range and where it can be concerning.

You may notice later that the target levels are also shown for information in the Moonshiner calculator as well, just for convenience.

After a short time, the User will be very familiar with the Target levels, and will be able to skip the self-assessment and will jump right into the Reef Moonshiner Tools and will enter the measured data in there, to see what the required corrections are for this times results.

If the daily elements are not detected, then those are ready to be dosed on a daily basis, in accordance to the dosing instructions from the Reef Moonshiner calculation tools.

If any of the daily elements are detected, it is recommended **not** to dose these elements daily then, they may have been or are been sufficiently supplemented via food or water changes etc. However, a change in Water change routine or change of food can quickly change that in the next ICP test. The daily elements are consumed and oxidized very quickly. We want to dose the daily elements, but don't want them to show up on the ICP tests, unless the more experienced user wants them to maintain for testing in a specific range to investigate its effect on the corals.

The "reference values" in the Test result and dosing instructions in the ICP result from ATI can be ignored if the Reef Moonshiner method will be applied. The column with the "reference value" is showing the ideal parameter you would need to maintain, IF you would try to maintain the ionic ratio of Seawater in line with your "current" salinity! Means, if your salinity would have been measured higher, all the trace elements would be shown higher in the "reference values". Unless you do not fully understand the ionic ratios of trace elements in natural seawater complex, these values can be ignored and won't be needed for our purpose.

The only reason to look at the results is to determine the required corrections, and if we can continue the daily dosing regime, or it will provide green light to start the daily dosages if this is the first time test. All this is extremely simplified if the "ICP Assessment and dosing tool" is used instead of the "Reef Moonshiner Calculator".

Calculate and perform the Corrections

With the knowledge of the current measured levels from the ICP test and the Target levels we want to achieve, it's now easy to identify which elements need correction! Basically, all elements that are below the target levels!

There are 2 ways now, how to assess the results and the required dosing:

- 1.) The easy way: Run the ICP Assessment and dosing tool (Automated to Target levels)
- 2.) Manual Calculation: Reef Moonshiner Calculator (Semi Automated Calculator)

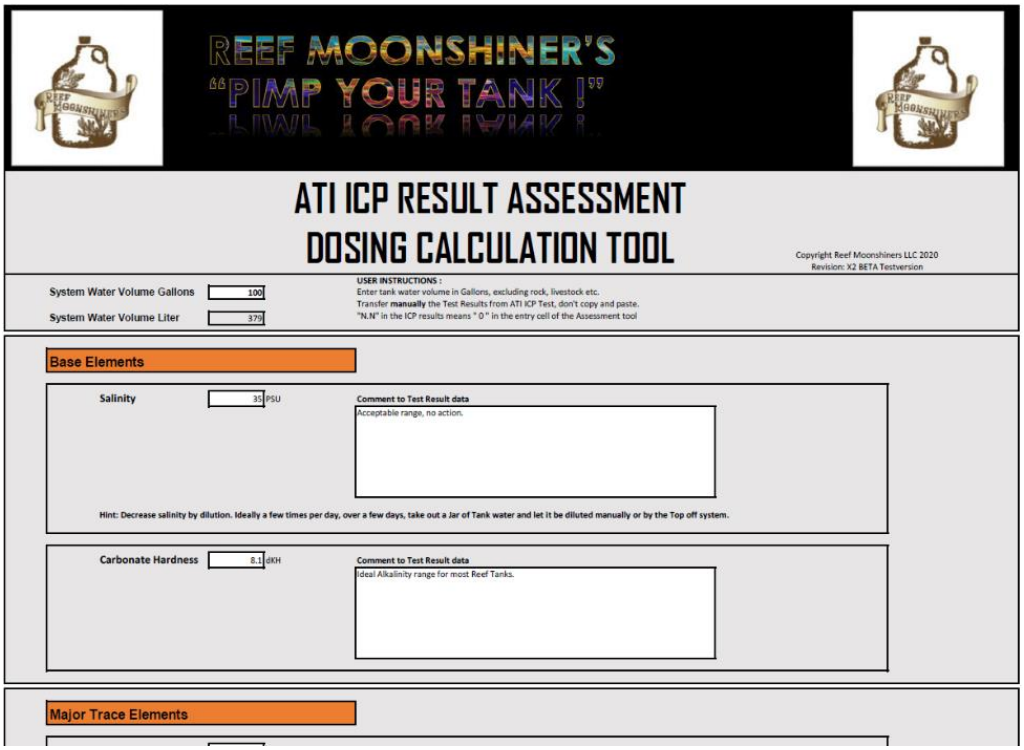
I will explain on more depth how the Reef Moonshiner calculator works in a later section if interested in the manual way, so here the quick and easy summary how to get the ICP results being assessed and the required dosing to be calculated.

First thing is to download the Reef Moonshiner tool from the Webstore.

https://andremueller.e-junkie.com/

ICP Assessment and Dosing tool

Using the Assessment tool is extremely easy.

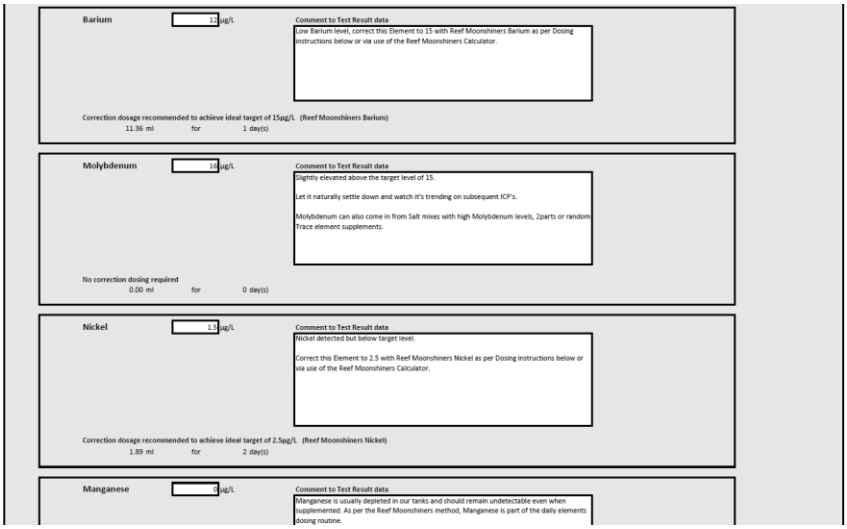


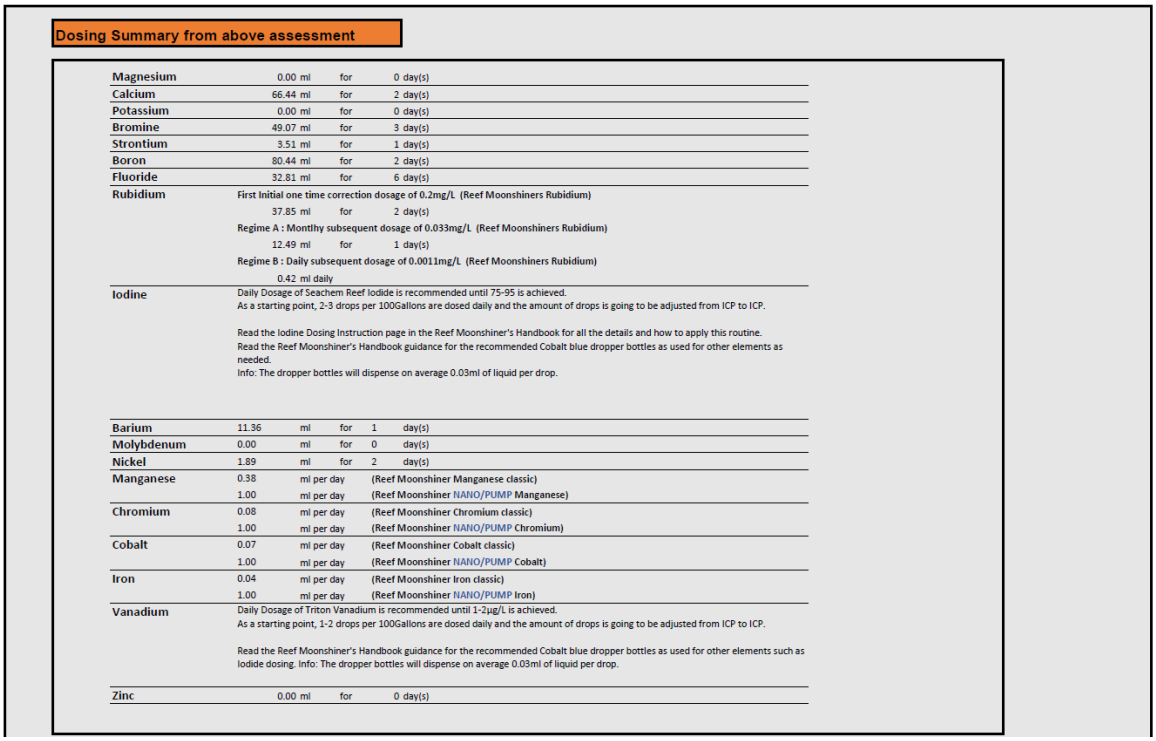
1. Enter the Tank system volume in Gallons into the tool, consider the Water volume with no rocks etc.
2. Transfer the Test results data from the ICP into the Assessment tool.
3. Read out the comments and get the corrections and daily elements dosages from the tool.

If parameter are acceptable, the tool will advise that no dosing is required.

Info: If level is acceptable, but dosing is still recommended and advised, this indicates that the tool instructs to dose back to the target level and the current level is slightly below target.

Means, dose back to target level to maintain optimal range.





Dosing Summary from above assessment

Magnesium	0.00	ml	for	0 day(s)
Calcium	66.44	ml	for	2 day(s)
Potassium	0.00	ml	for	0 day(s)
Bromine	49.07	ml	for	3 day(s)
Strontium	3.51	ml	for	1 day(s)
Boron	80.44	ml	for	2 day(s)
Fluoride	32.81	ml	for	6 day(s)
Rubidium	**First Initial one time correction dosage of 0.2mg/L (Reef Moonshiners Rubidium)**			
	37.85	ml	for	2 day(s)
	Regime A : Monthly subsequent dosage of 0.033mg/L (Reef Moonshiners Rubidium)			
	12.49	ml	for	1 day(s)
	Regime B : Daily subsequent dosage of 0.0011mg/L (Reef Moonshiners Rubidium)			
	0.42	ml daily		
Iodine	Daily Dosage of Seachem Reef Iodide is recommended until 75-95 is achieved. As a starting point, 2-3 drops per 100Gallons are dosed daily and the amount of drops is going to be adjusted from ICP to ICP. Read the Iodine Dosing Instruction page in the Reef Moonshiner's Handbook for all the details and how to apply this routine. Read the Reef Moonshiner's Handbook guidance for the recommended Cobalt blue dropper bottles as used for other elements as needed. Info: The dropper bottles will dispense on average 0.03ml of liquid per drop.			
Barium	11.36	ml	for 1	day(s)
Molybdenum	0.00	ml	for 0	day(s)
Nickel	1.89	ml	for 2	day(s)
Manganese	0.38	ml per day	**(Reef Moonshiner Manganese classic)**	
	1.00	ml per day	**(Reef Moonshiner NANO/PUMP Manganese)**	
Chromium	0.08	ml per day	**(Reef Moonshiner Chromium classic)**	
	1.00	ml per day	**(Reef Moonshiner NANO/PUMP Chromium)**	
Cobalt	0.07	ml per day	**(Reef Moonshiner Cobalt classic)**	
	1.00	ml per day	**(Reef Moonshiner NANO/PUMP Cobalt)**	
Iron	0.04	ml per day	**(Reef Moonshiner Iron classic)**	
	1.00	ml per day	**(Reef Moonshiner NANO/PUMP Iron)**	
Vanadium	Daily Dosage of Triton Vanadium is recommended until 1-2µg/L is achieved. As a starting point, 1-2 drops per 100Gallons are dosed daily and the amount of drops is going to be adjusted from ICP to ICP. Read the Reef Moonshiner's Handbook guidance for the recommended Cobalt blue dropper bottles as used for other elements such as Iodide dosing. Info: The dropper bottles will dispense on average 0.03ml of liquid per drop.			
Zinc	0.00	ml	for	0 day(s)

The tool comes with a summary section of all recommended dosing identified by the Test results that have been entered.

This is the perfect overview to print and check off the corrections performed.

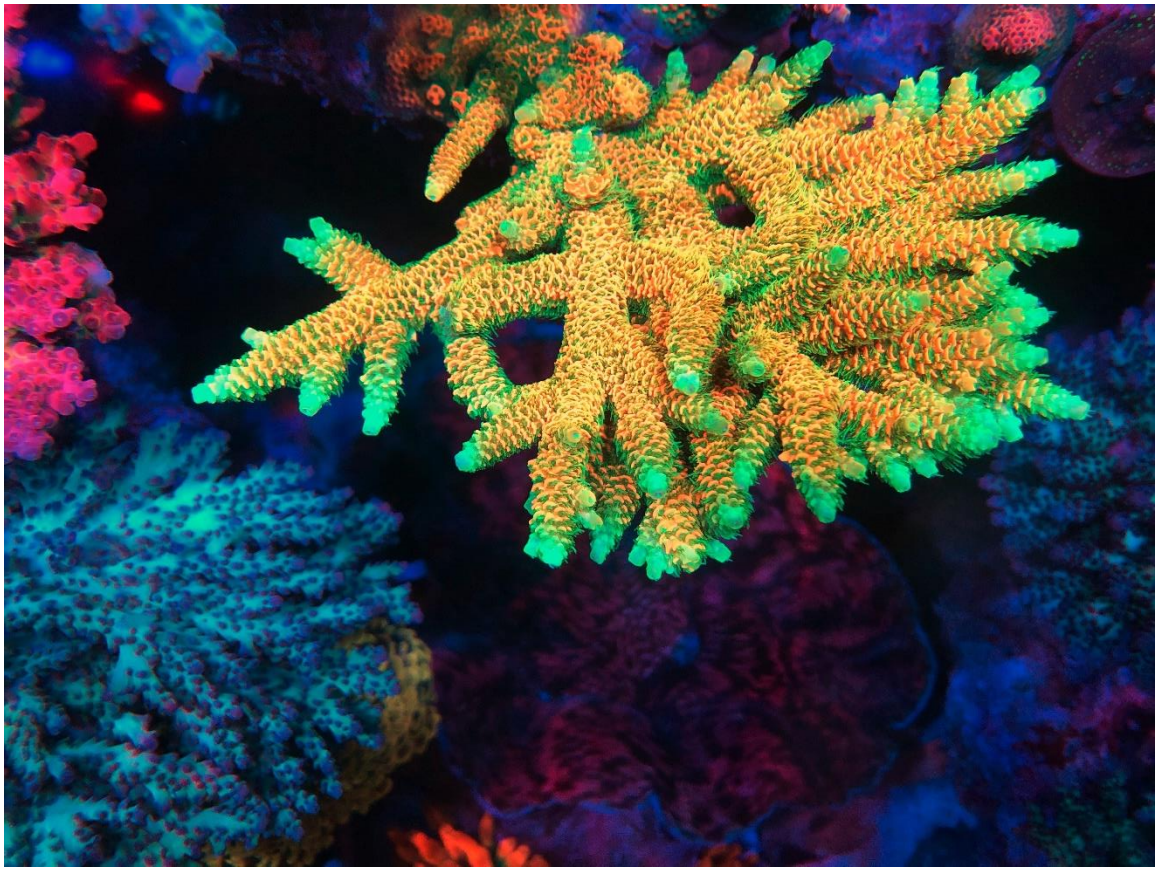
If multiple options are given for one Elements sich as the daily elements Manganese, Cobalt, Chromium and Iron, that is because there multiple Reef Moonshiner products available with different configuration. For example, the Manganese is also available as NANO/PUMP version for smaller Aquariums or use on Dosing Pumps. More about this in the Handbook below.

A first-time shoppers list is included as well, to get an idea which elements are required to be dosed. Please read in the next section of this Handbook which particular Elements and Products are recommended to be used.

First Time user Shopping list

Brightwell Magnesion-P	Not required
Brightwell Calcion-P	Required
Brightwell Potassion-P	Not required
Reef Moonshiners Bromine	1 Bottle(s) Required
Brightwell Strontion-P	Required
Reef Moonshiners Boron	1 Bottle(s) Required
Reef Moonshiners Fluoride	1 Bottle(s) Required
Reef Moonshiners Rubidium	1 Bottle(s) Required
SeaChem Reef Iodide	Required
Reef Moonshiners Barium	1 Bottle(s) Required
Reef Moonshiners Molybdenum	Not required
Reef Moonshiners Nickel	1 Bottle(s) Required
Reef Moonshiners Manganese	1 Bottle(s) Required
Reef Moonshiner Chromium	1 Bottle(s) Required
Reef Moonshiners Cobalt	1 Bottle(s) Required
Reef Moonshiners Iron	1 Bottle(s) Required
Triton Vanadium	Required
Reef Moonshiners Zinc	Not required
Reef Moonshiners Liqui-Mud	Strongly recommended, but not required, review feedback in the RM Support Group
Reef Moonshiners VitaminX	Strongly recommended, if no other Vitamins are supplemented. Doesn't affect Skimmer

Please also read the Troubleshooting section later in this Handbook which has great information about the Water Change free Reefing regimen along with this method and useful guidance on troubleshooting low PH tanks and activated carbon application.





Elements and Solutions needed

As mentioned, the entire method is a mix of Reef Moonshiner Elements and common products available online or at LFS.

Here is the summary of Elements and Chemicals I recommend to use from experience. All these are the ones I personally use and are supported with the Moonshiner calculation tool.

The Reef Moonshiner Elements can be found under this link:

https://andremueller.e-junkie.com/

Salinity

To maintain Salinity at the desired levels, I recommend placing a jar filled with dry salt into the sump and let it dissolve slowly until salinity is reached. This is a gentle and simple way to keep salinity corrections done without water changes via high salinity water.

Alkalinity

To maintain Alkalinity, any product or any system can be used to maintain this parameter. Either dosing pump systems, or Calcium reactors can be used.

Please ensure that a 2 part is used that does not contain additional Trace elements, which would then can interfere with the Moonshiner Method and you may run into overdosing of certain elements if those are insufficiently consumed. Doesn't mean it will, but the risk is high.

Magnesium (Brightwell Magnesion-P)

To maintain Magnesium levels, literally any method is great to use, however in order to perform corrections very easily on Magnesium, I recommend using the Brightwell Magnesion-P which is the granular Magnesium that can be mixed with RODI at home.

The Moonshiner calculator can be used for corrections if Magnesium need to be increased. As also stated in the Moonshiner calculator note section, the required mix is 200gram of granules into 1,000ml (1 Liter or 1,000gram of Water) of RODI water. I recommend using a kitchen scale to weigh the RODI water amount, instead of measuring it.

When mixing Magnesion-P, the solution will react chemically and will get very hot. Use appropriate chemical lab supplies and protective equipment while mixing. Safety first!

Please be aware that other Products are not compatible with the Reef Moonshiner Calculator!

Calcium (Brightwell Calcion-P)

To maintain Calcium levels, literally any method is great to use, however in order to perform corrections very easily on Calcium, I recommend using the Brightwell Calcion-P which is the granular Calcium Chloride that can be mixed with RODI at home.

The Moonshiner calculator can be used for corrections if Calcium needs to be increased. As also stated in the Moonshiner calculator note section, the required mix is 200gram of granules into 1,000ml (1 Liter or 1,000gram of Water) of RODI water. I recommend using a kitchen scale to weigh the RODI water amount, instead of measuring it.

Please be aware that other Products are not compatible with the Reef Moonshiner Calculator!

Potassium (Brightwell Potassion-P)

To maintain Potassium levels, literally any method is great to use, however in order to perform corrections very easily on Potassium, I recommend using the Brightwell Potassion-P which is the powdered Potassium salt that can be mixed with RODI at home.

The Moonshiner calculator can be used for corrections if Potassium need to be increased. As also stated in the Moonshiner calculator note section, the required mix is 100gram of powdered salt into 1,000ml (1 Liter or 1,000gram of Water) of RODI water. I recommend using a kitchen scale to weigh the RODI water amount, instead of measuring it.

When mixing Magnesion-P, use appropriate chemical lab supplies and protective equipment while mixing. Safety first!

Please be aware that other Products are not compatible with the Reef Moonshiner Calculator!

Bromine (Reef Moonshiner Element)

To maintain element levels, simply use the Reef Moonshiner's Element, to be dosed as correction after the ICP results. Use the Moonshiner Dosing calculator to determine the required dosage.

Strontium (Brightwell Strontion-P)

To maintain Strontium levels, literally any method is great to use, however in order to perform corrections very easily on Strontium, I recommend using the Brightwell Strontion-P which is the powdered Strontium that can be mixed with RODI at home.

The Moonshiner calculator can be used for corrections if Strontium need to be increased. As also stated in the Moonshiner calculator note section, the required mix is 100gram of powder into 1,000ml (1 Liter or 1,000gram of Water) of RODI water. I recommend using a kitchen scale to weigh the RODI water amount, instead of measuring it.

When mixing Strontion-P, use appropriate chemical lab supplies and protective equipment while mixing. Safety first!

Please be aware that other Products are not compatible with the Reef Moonshiner Calculator!

Boron (Reef Moonshiner Element)

To maintain element levels, simply use the Reef Moonshiner's Element, to be dosed as correction after the ICP results. Use the Moonshiner Dosing calculator to determine the required dosage.

Fluorine (Reef Moonshiner Element)

To maintain element levels, simply use the Reef Moonshiner's Element, to be dosed as correction after the ICP results. Use the Moonshiner Dosing calculator to determine the required dosage.

Fluorine and Fluoride is meant in the same way.

Iodine/Iodide (Seachem Reef Iodide)

To maintain element levels for Iodine, this is a bit trickier. Iodine itself is simply said, Iodide that is oxidized to Iodine. Iodine will remain in this form for a short while until further oxidized to Iodate which is as of today's knowledge pretty useless….. so far!

Means, if Iodine is measured low or depleted in the tank, the assumption is that as well Iodide is low since Iodine derives from Iodide. Pretty clear, right? To avoid confusion and make it simple to cover both elements, we will dose daily drops of Seachem Reef Iodide to maintain a constant amount of Iodide and Iodine. The ICP will only measure the Iodine levels, and hence the oxidation from Iodide to Iodine is depending on a lot of chemical factors in the tank such as PH, Oxygen levels and skimmer performance etc. we cannot predict the daily amounts needed!!!

This element is the most challenging element to maintain, however as soon the daily drops needed to maintain the desired target level are found, the continuous supplementation daily will result in a very stable Iodine level. Patience here, the daily drops will have to be adjusted from ICP to ICP and usually takes 3-4 ICP's on average to find the sweet spot and then barely change if no significant change on the system will be done!

So if Iodine is low (please see the self-assessment section), the Reefer starts to dose Iodide daily for example with 2-3 drops per day for each 100 Gallon of system volume. Depending on the subsequent ICP results, the daily drops will be increased or decreased by 1 or 2 drops per 100 Gallon, and subsequent ICP's will show the effects on the tank.

Do not do single dose corrections as per bottle, since those only cause large spikes in Iodine with subsequent drops in Iodine levels. Daily supplementation is the way for success and stability on this extreme important element!

Ideally give it at least a week of supplementation after adjustments of the daily drops, before sending out a new ICP, since the oxidation process will take a while.

I personally buy from Amazon or other online sources a 2 or 4-ounce Cobalt blue glass dropper bottle, that I use for the Seachem Iodide to allow precise dosing of the daily drops! Some Grocery stores also sell them, but I prefer online stores since the bottles are most likely not been used before.

Also please do not try to substitute the Seachem Reef Iodide. It is from experience the most consistent Iodide I found so far, and I have tried other brands too. Imagine the concentration is extremely important so you won't need to find your sweet spot of daily dosages again when buying the next bottle. Seachem apparently provides a solid and consistent product here. Consider also to buy rather small bottles than large bottles. As soon the bottle is opened, the oxidation starts, hence I use the small bottles, fill my dropper glass bottle and keep the Seachem bottle closed and stored dark and inside the house.

Barium (Reef Moonshiner Element)

To maintain element levels, simply use the Reef Moonshiner's Element, to be dosed as correction after the ICP results. Use the Moonshiner Dosing calculator to determine the required dosage.

Molybdenum (Reef Moonshiner Element)

To maintain element levels, simply use the Reef Moonshiner's Element, to be dosed as correction after the ICP results. Use the Moonshiner Dosing calculator to determine the required dosage.

Nickel (Reef Moonshiner Element)

To maintain element levels, simply use the Reef Moonshiner's Element, to be dosed as correction after the ICP results. Use the Moonshiner Dosing calculator to determine the required dosage.

Manganese (Reef Moonshiner Element)

If not detected on the ICP, simply use the Reef Moonshiner's Element, to be dosed as daily element in line with the Moonshiner Dosing calculator to determine the required dosage.

Chrome/Chromium (Reef Moonshiner Element)

If not detected on the ICP, simply use the Reef Moonshiner's Element, to be dosed as daily element in line with the Moonshiner Dosing calculator to determine the required dosage.

Cobalt (Reef Moonshiner Element)

If not detected on the ICP, simply use the Reef Moonshiner's Element, to be dosed as daily element in line with the Moonshiner Dosing calculator to determine the required dosage.

Iron (Reef Moonshiner Element)

If not detected on the ICP, simply use the Reef Moonshiner's Element, to be dosed as daily element in line with the Moonshiner Dosing calculator to determine the required dosage.

Silver (Reef Moonshiner Element)

Currently under testing.

Vanadium (Triton)

If not detected on the ICP, simply use the Triton Vanadium, to be dosed as daily as a single drop per 100G each day. I keep doing daily drops to maintain Vanadium barely detectable only in the range of 1-2 Microgram/L.

If detected, no action required.

Zinc (Reef Moonshiner Element)

To maintain element levels, simply use the Reef Moonshiner's Element, to be dosed as correction after the ICP results. Use the Moonshiner Dosing calculator to determine the required dosage.

Tin (Reef Moonshiner Element)

Currently under testing. Determination if more beneficial to be dosed daily or as correction after ICP, when not detected.

If detected, no action required.

Rubidium (Reef Moonshiner Element)

To maintain element levels, simply use the Reef Moonshiner's Element, to be dosed as correction on a initial dosage and then monthly or quarterly.

Use the Moonshiner Dosing calculator to determine the required dosage. Rubidium is not a mandatory element to be dosed in the beginning, however it has shown to be extremely beneficial to mixed reefs that also include Torches, Zoa, and exotic Shrooms and other Soft corals. The experience is from trials is that Bounces and Shrooms and Zoa are reproducing much quicker and more than without the supplementation of Rubidium.

Rubidium is usually always going nearly depletion levels in normal tanks, since it is a costly element and barely included in most supplements and Salt mixes.

The initial dosage is 0.2mg/L and then 0.1mg/L quarterly or 0.033mg/L on a monthly basis.

I have intentionally overdosed Rubidium to 0.7mg/L with no adverse and no better results, and hence, I recommend at least to maintain natural seawater level ranges to avoid low levels or depletion. It is safe to assume that Rubidium can be supplemented even while not part of the ATI ICP results and tests. Coralvue ICP test would be sufficient to test for it, if desired like once a year in addition to the ATI ICP.

Nitrate (Loudwolf Sodium/Potassium Nitrate)

If desired to be dosed, the Reef Moonshiner calculator has a calculation and mixing recipe in the note section. Either Sodium Nitrate (NOT NITRITE!!!) or Potassium Nitrate is supported by mixing one of the 2 choices with RODI water. I recommend discarding Nitrate solutions after 3-6 months due to potential micro bacterial growth inside the bottles. Bacteria will be introduced from RODI systems and can grow a significant amount of pathogens in worst case. Available from Loudwolf's website.

Phospates (Now Spirulina Powder)

If Po4 is desired to be increased, I recommend the use of Spirulina super food to be used. This is organic addition of Po4, and gentle use will show effects after a few days. I recommend usually to supplement 1-2 Mini spoons as from Red Sea Pro Test kits per 100G per day and adjust after a few days. Please bear in mind that tanks which were starving from Po4 for a longer time, usually consume a lot more in the first few days until saturated and levels begin to raise, so watch out for this sudden effect to avoid Po4 spikes at the end.

Also see my e-book on this subject "Andre's Reef Guide Part1" on my webstore which is written around issues with nutrient control and many other subjects around a functioning biology.

Special Element – Lithium (ATI)

In a very few instances it may be required to adjust Lithium if very low.

I recommend using the ATI supplement in case Lithium is required to be adjusted. Normally Lithium can only deplete if specific filters are used or too much DETOX has been applied.

ATI would also indicate the supplementation on their Test results if needed to be corrected.

Special Element – Copper (Reef Moonshiner Element)

Copper is an important element but apparently sufficiently been supplemented with food or Water changes and been carried in as pollutant by many other sources.

As soon Copper is detected it will already affect the colors and usually depresses the fluorescence of corals. It is therefore really hard to determine how much is needed, if needed anyways!

Today's ICP tests are still not precise enough to tell us the measurement precise enough in order to work with copper as a daily element.

I recommend this element only to very experienced Reefkeeper and very low dosages to be used with highest attention and awareness.

Usually I decline to sell this element to less experienced Reefkeeper.

"Classic Elements" versus "NANO/PUMP Elements"

On the Webstore and Calculator, you will find Manganese, Iron, Cobalt and Chromium available in 2 different products each.

The Elements are for the same purpose but are different in concentration.

The NANO/PUMP elements are defined in it's Product name on the webstore and within the calculator so there is a clear difference in the name.

So depending on your choice of Product, ensure later that you select the right dosing instructions from the Calculator output.



Classic Elements

The above-mentioned classic elements, that are not shown as NANO/PUMP elements are higher in concentration. The benefit is that those will last longer since there is less liquid required, however in smaller tanks it will be much more difficult to dose these very small amounts, especially on Nano tanks. You can open the calculator and look between the different amounts required between the 2 types as soon you entered the tank volume into the calculator.

On larger tanks of 200 gallon and larger, and if no dosing pump is available, and manual dosing is preferred anyways, the classic elements are the ideal choice and will last for long time.

You may find that 0.05ml to 0.1ml for example is difficult to dose on your tank, which on request I offer now as well the NANO/PUMP elements which are concentrated to be dosed more easily as well can be used on most dosing pump systems.



NANO/PUMP Elements

NANO/PUMP elements are lower in concentration and will allow more liquid to be dosed as part of the daily routine and is very convenient for tanks below 200Gallon and are recommended for Nano tanks!

The concentrations are aligned to match the daily recommended dosage of 1ml per 100G per day, which comes very useful, if the daily elements are being used on automated tanks that utilize dosing pump systems.

You can open the calculator and look between the different amounts required between the 2 types as soon you entered the tank volume into the calculator.

Imagine, a single drop of liquid is about 0.03ml.

Shipping

Shipment of Elements will be processed through UPS Ground as default, or Pickup if local.

US domestic is the standard, if you like to inquire Shipment into other countries please contact me via email or via webstore contact form.



Dosing the Elements

With the elements on hand now and the required solutions been determined with the Moonshiner calculator, here some guideline about the Solutions and how to dose them.

Weigh the solutions

Instead of measuring solution amounts, I prefer to simply weigh the required amounts of solutions if the amount is more than the 1ml Syringe can handle.

For that a simple kitchen scale with dual units will do best. Make sure the digital scale shows grams, means metric units.

1gram of solution is considered 1ml. Means if a correction of 54ml has to be dosed, you will place the empty dosing container on the scale, zero it out and measure 54grams, and you have the required amount ready without the hassle to deal with measuring cups or syringes which is less accurate and more complicated.

Dosing the "correction" solutions into the system

Corrections dosages I recommend to ideally dose into the Overflows, or slowly into the first sump section to allow the solution to be as diluted as possible before the return pump will bring it into the tank again.

All corrections can be dosed right after each other with a minute between.

Pay attention to the calculator output for how many days the correction is spread out to. It will show if it is a single day or spread out over multiple days.

Dosing the "daily" solutions into the system

Daily dosages can be dosed directly into the display tank right after each other.

All dosages can be dosed right after each other.

It has not been identified at which time the dosing shall occur best, so at this point whatever the most convenient time is, should be used.

Dosing during vacation or absence

I strongly recommend to simply skip the dosing for vacation or short-term absence from Reefing duties. The risk of someone else doing the daily dosages for you incorrectly, and the potential unpredictable results, is much higher than the week or two of not dosing.

Dosing in advance

In certain case, the users are in the situation of work life is not allowing them to be home all week to do the daily corrections, hence I would recommend to account for the required solutions per day to be dosed in advance for up to 5 days. This is less effective than the daily dosages, but still more beneficial than not to dose.

Iodine dosing and readings very likely fluctuate then more on the ICP test results, just account for this fact.

Mixing Elements and Handling

Under no circumstance pre-mix the elements with each other!

That would cause chemical reactions and oxidizing processes and the purpose of the dosing would not be achieved since elements would oxidize likely to unusable states of oxidation.

To keep a theoretical shelf life of many years if kept separate and not contaminated with each other, please use individual Syringes and don't contaminate with each other or Tank water.

Ideally use the Syringes that come with the Reef Moonshiner Elements for each bottle and use for example Rubber bands to attach the Syringe, so they won't get mixed up.

In case they got contaminated with each other or tank water, ….. buy them all new! Just kidding, the impact and contamination is not a deal breaker, but will affect the elements on the long run if done this way.

To be honest, even while not recommended, I personally use one and the same Syringe for all my daily dosages, however, never pour one remaining element in the syringe into another bottle and never touch the tank water with the Syringe to avoid bacterial contamination. I also mark the end of the Syringe with a Pen, so I know how much I need to pull the Syringe plunger out.

Store the elements at Room Temperature, no need for any Elements to be refrigerated.

Shelf life is theoretically for many years if unopened. After opening and first use, the approximate shelf life is about 2-3 years if not contaminated.

Compability with other Trace element Products

In order to make this method and system a success, it must be understood, that while applying the Reef Moonshiner's method, along with other Products that contain Trace elements other than Alk, Calcium and Magnesium, Potassium and Strontium may interfere with this method. I would recommend avoiding any other Brands coloration programs and supplements.

Also, it need to be understood, that the Reef Moonshiner calculator only supports the listed Products since every Brand maintains its own concentrations on supplements.

Compability with Calcium Reactors

The Reef Moonshiners method is supported by the application of calcium reactors since a calcium reactor with good grade media also supplements specific trace elements, depending on the media used. A calcium reactor usually can't keep up with the elements in the desired target levels, but it compensates certain elements and therefore reduces the required corrections after ICP. However, it is not required to be used in conjunction with calcium reactors.

Compability with other Nutrient reducing methods

The Moonshiner method is intended to manage the Reef Chemistry with the focus on Trace elements and can be used along with any method that is applied to reduce nutrients.

The daily elements by the way, do significantly support Refugium systems, since many of the Trace elements are needed by all Refugium algae types. Typically, the Refugium performance improves shortly after applying the method.

Safety precautions

Handling of all chemicals in general, which also applies to any other household chemicals shall be performed with care and attention and appropriate Safety equipment such as gloves and safety glasses.

Accidental exposure on skin wash hands and any exposed skin thoroughly after handling.

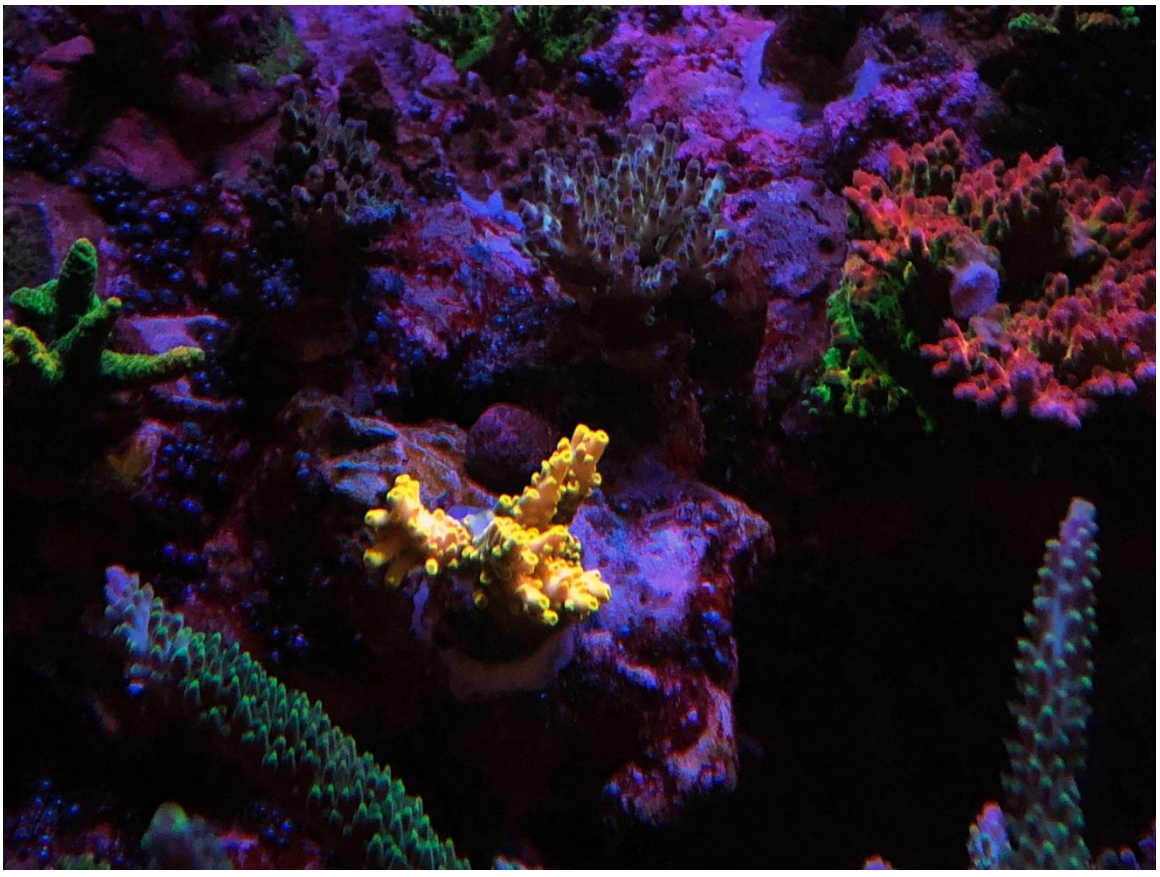
Wear eye protection/face protection such as safety glasses.

Elements are not suitable for Human consumptions or Pets.

If exposed to eyes, rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists, get medical advice/attention.

Relationship to any of the mentioned Brands/Products/Vendors

I'm personally use these brands and products because of the very positive experience, and I have not, and even will not in future accept any form of compensation from Vendors and Brands I'm recommending in any of my articles or publications.





Dosing individual Trace elements

Benefits

No limitation on Livestock such as the most sensitive SPS species after the corrections, that require high level maintenance normally. This method brings the tank to highest level standards, without having a Master's degree in Chemistry or Biology!

Apparently, the myth, that sensitive Shrooms, Zoa and Soft Corals can't thrive together in SPS dominated tanks can be put to an end. From the last years experiences, the daily dosages of metals and maintenance of the other trace elements, clearly indicate that there are no more issues with keeping all these species in a mixed Reef environment even under low nutrient conditions.

As mentioned earlier, the individual dosing of these important elements with the Reef Moonshiner method just does not make sure the required trace elements are maintained in sufficient levels to make sure the calcification process will not be limited by any of those, it also will provide constantly all relevant metals that are needed for the metabolism of corals and their tissue to avoid any limitations for unfolding their fluorescent proteins.

This method will also avoid the overdosing of certain elements. Keep in mind that each tank is indeed different, and the elements are consumed individually in different amounts. A lot of trace element products are literally combinations of Traces and the supplementation ratio is fixed by the mix of the associated product. However, the consumption ratio is always individual for each tank as it's supplemented, hence a lot of times certain elements will be less consumed and literally creep up over time into undesired levels if not careful.

This method actually does allow to create and really finetune the existing Saltwater to any desired configuration.

Freedom for experimental controlled dosing is now also be possible for experienced Reefkeeper since the Moonshiner calculator and Elements allow precisely to dose to intended and specific levels.

With this method and flexibility to replenish any of the most important trace elements, many tank systems can switch to a Water change free system without the disadvantage of Trace Element depletion over time, since those are supplemented in a very controlled fashion.

The ICP test result routine will be the Reefkeeper's dashboard, to see if there is anything wrong with the water chemistry, therefore no more questioning if anything is depleted or maybe excessive. It usually also indicates early enough signs when something may go into the wrong direction by slowly increasing Aluminum levels or sudden signs of copper which can indicate equipment failure.

A much more relaxed Reefer life, no more chasing of numbers when it comes to Trace elements.

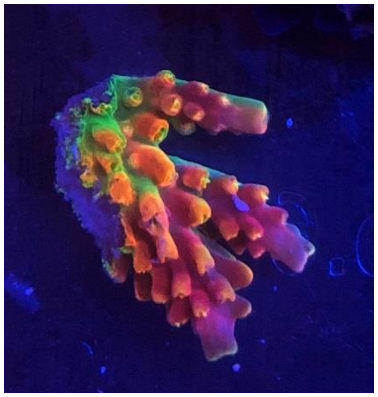
Probably the most economic method to maintain the entire Reef Chemistry.

Long term stability of the tank system, when going Water change free, with no weekly shocks of the tank parameter.

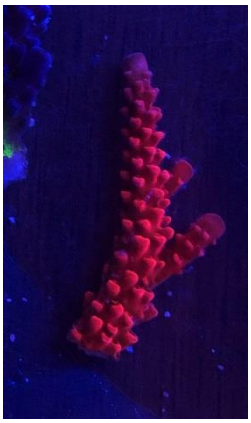
Disadvantages

Reefkeeper may need a bigger tank system, frag tank systems and more Frag racks! Sounds really funny, however most of the Beta Test users that applied the full method ended up with additional Frag tank systems or Tank upgrades. So that may become a real issue!

The initial costs are a bit higher, depending on the first time ICP results. Hence spread the word about the results of this method and your tank progress ;-)



I recommend most people, to split the initial cost for the investment into 2 steps. Tanks that do not use any color or trace programs from other brands, can usually start to dose the daily elements and Rubidium already even without the ICP results, and will buy the remaining elements for corrections after the ICP provides clarity what is really needed. That usually splits the initial investment into the method.



The ICP results may also indicate issues we like to keep under the carpet, however in order to be successful in the hobby, we have to be honest with ourselves sometimes!

Next steps

After a correction being performed, and daily elements started to be supplemented, the usual timeframe for taking the next sample and sending the sample out for next the ICP is 2 weeks.

With a considered 2 weeks turnaround, the ICP testing cycle will end up in a routine of 4-6 weeks of ICP testing cycle, which can be extended if only minor corrections are required after the ICP results. The cycle looks like this: ICP results received, corrections performed, 2 weeks later sending the next sample. That usually leads to the monthly ICP routine in the beginning. After a few ICP's and monthly corrections, the Reefer will then see how the consumption characteristic from the tank is and can extend the ICP cycle.

After stabilization, the Reefer will get a picture of the needed corrections from month to month and can almost predict the monthly corrections needed and will dose "assumed corrections" (a bit less) in order to extend the testing cycle. I recommend not to do so in the first 3-4 months, since the tank will need to wake up first to show its real growth and element consumption.

Most users will be able to switch to bimonthly testing or longer after a few rounds of corrections.

Typically, the first time test does indicate the largest corrections, subsequent test are usually indicate much lower corrections needed.

Watch out for Alk, Calcium and Magnesium consumptions after starting the method. You still should use good test kits for those 3 parameter since as soon the trace elements are corrected, usually the corals start to boost in their metabolism and will consume much more major elements such as Alk and Ca as a result, and if these are not been monitored, they will drop too low and may cause a limitation, so watch out for these and adjust to new tank consumptions after measuring and observing these.

This method will basically manage the entire chemistry only, the Reefkeeper is free of choice to use any Nutrient management system as desired. I recommend reading my e-Book "Andre's Reef Guide Part 1" if you have issues with your bacteria biology, good info in there and a lot of hints on the hobby. Low nutrient systems are perfectly fine as long the tank doesn't starve from nutrients over a longer period.

You should bear in mind that it is important to keep a healthy PH in the tank. I recently explored a lot of tanks where the excessive carbonic acids in form of Co2 caused the PH to be lower than 7.80-7.85 in the morning. If you have low PH in the morning you need to work on the Co2 introduction/degassing balance. In many cases it turned out that it was not just the case that excessive levels of room Co2 were introduced into the tank, also the degassing of Co2 out of the tank became an issue due to reduced water agitation, low noise overflows, enclosed furniture and at the end resulted in high Co2 levels in the water. If the PH is that low, you need to resolve this situation, otherwise even the Reef Moonshiner method can't help to get healthy and colorful growing corals in the tank!

I recommend generally prior using Amino Acids or Vitamins of any kind to run the tank without these additional supplements to identify the real progress you can achieve without those products. I say that because many people still think if the tank has some nutrients available, and corals won't color up, its all because Amino acids are missing which is a big misconception. Amino acids are supplemented with foods and pale corals are not because the Aminos are missing. You can use the Amino acids later on to enhance the existing coral coloration carefully, but not to fix pale and bleached corals, that won't work. Please remain patient and focus on biology and chemistry and feed multiple times a week your corals with good grade food and start to apply the use of Amino acids when you have already achieved great coloration to further experiment with addition of Vitamins or Amino acids. Don't believe that Aminos only will fix your pale colors.



Reef Moonshiner's Support Group

Stay in touch concerning new Elements and updates on the Calculator and this Guideline, chat with other Reef Moonshiner users, or share your progress or concerns via the Reef Moonshiner support group on Social Media Platform Facebook at this link :

https://www.facebook.com/groups/1755992217822887/

Reef Moonshiner Dosing Calculator

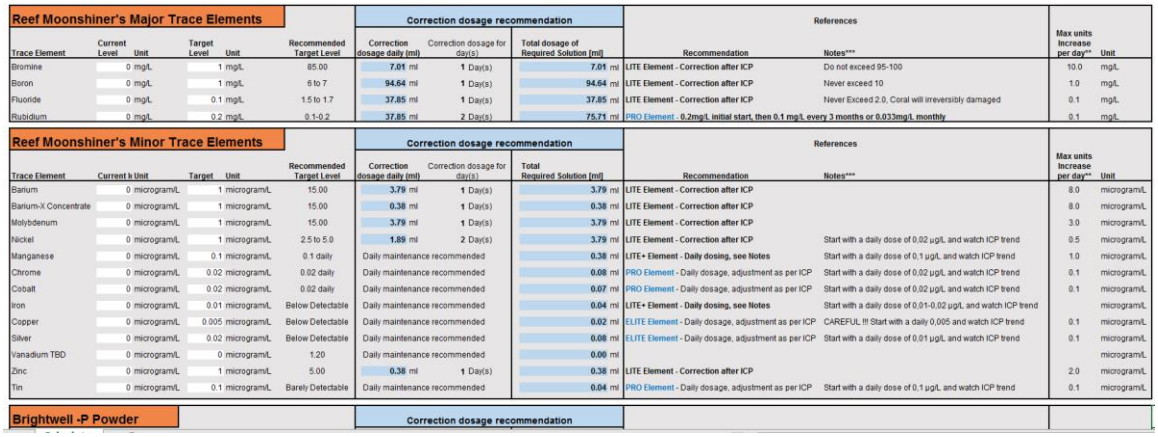
Calculate and perform the Corrections

With the knowledge of the current measured levels from the ICP test and the Target levels we want to achieve, it's now easy to identify which elements need correction! Basically, all elements that are below the target levels!

I will explain on more depth how the calculator works, but here the quick and easy summary with an example.

First thing is to download the Reef Moonshiner from the Webstore.

https://andremueller.e-junkie.com/



Reef Moonshiner's Major Trace Elements

Trace Element	Current Level	Unit	Target Level	Unit	Recommended Target Level	Correction dosage daily (ml)	Correction dosage for day(s)	Total dosage of Required Solution [ml]	Recommendation	Notes***	Max units Increase per day**	Unit
Bromine	0	mg/L	1	mg/L	85.00	7.01 ml	1 Day(s)	7.01 ml	LITE Element - Correction after ICP	Do not exceed 95-100	10.0	mg/L
Boron	0	mg/L	1	mg/L	6 to 7	94.64 ml	1 Day(s)	94.64 ml	LITE Element - Correction after ICP	Never exceed 10	1.0	mg/L
Fluoride	0	mg/L	0.1	mg/L	1.5 to 1.7	37.85 ml	1 Day(s)	37.85 ml	LITE Element - Correction after ICP	Never Exceed 2.0, Coral will irreversibly damaged	0.1	mg/L
Rubidium	0	mg/L	0.2	mg/L	0.1-0.2	37.85 ml	2 Day(s)	75.71 ml	PRO Element - 0.2mg/L initial start, then 0.1 mg/L every 3 months or 0.033mg/L monthly		0.1	mg/L

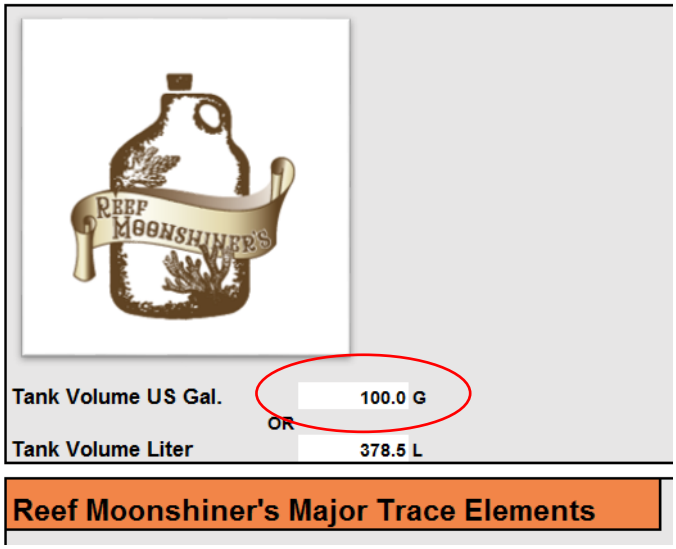
Reef Moonshiner's Minor Trace Elements

Trace Element	Current k	Unit	Target	Unit	Recommended Target Level	Correction dosage daily (ml)	Correction dosage for day(s)	Total Required Solution [ml]	Recommendation	Notes***	Max units Increase per day**	Unit
Barium	0	microgram/L	1	microgram/L	15.00	3.79 ml	1 Day(s)	3.79 ml	LITE Element - Correction after ICP		8.0	microgram/L
Barium-X Concentrate	0	microgram/L	1	microgram/L	15.00	0.38 ml	1 Day(s)	0.38 ml	LITE Element - Correction after ICP		8.0	microgram/L
Molybdenum	0	microgram/L	1	microgram/L	15.00	3.79 ml	1 Day(s)	3.79 ml	LITE Element - Correction after ICP		3.0	microgram/L
Nickel	0	microgram/L	1	microgram/L	2.5 to 5.0	1.89 ml	2 Day(s)	3.79 ml	LITE Element - Correction after ICP	Start with a daily dose of 0.02 µg/L and watch ICP trend	0.5	microgram/L
Manganese	0	microgram/L	0.1	microgram/L	0.1 daily	Daily maintenance recommended		0.38 ml	LITE+ Element - Daily dosing, see Notes	Start with a daily dose of 0.1 µg/L and watch ICP trend	1.0	microgram/L
Chrome	0	microgram/L	0.02	microgram/L	0.02 daily	Daily maintenance recommended		0.08 ml	PRO Element - Daily dosage, adjustment as per ICP	Start with a daily dose of 0.02 µg/L and watch ICP trend	0.1	microgram/L
Cobalt	0	microgram/L	0.02	microgram/L	0.02 daily	Daily maintenance recommended		0.07 ml	PRO Element - Daily dosage, adjustment as per ICP	Start with a daily dose of 0.02 µg/L and watch ICP trend	0.1	microgram/L
Iron	0	microgram/L	0.01	microgram/L	Below Detectable	Daily maintenance recommended		0.04 ml	LITE+ Element - Daily dosing, see Notes	Start with a daily dose of 0.01-0.02 µg/L and watch ICP trend		microgram/L
Copper	0	microgram/L	0.005	microgram/L	Below Detectable	Daily maintenance recommended		0.02 ml	ELITE Element - Daily dosage, adjustment as per ICP	CAREFUL !!! Start with a daily 0.005 and watch ICP trend	0.1	microgram/L
Silver	0	microgram/L	0.02	microgram/L	Below Detectable	Daily maintenance recommended		0.08 ml	ELITE Element - Daily dosage, adjustment as per ICP	Start with a daily dose of 0.01 µg/L and watch ICP trend	0.1	microgram/L
Vanadium TBD	0	microgram/L	0	microgram/L	1.20	Daily maintenance recommended		0.00 ml				microgram/L
Zinc	0	microgram/L	1	microgram/L	5.00	0.38 ml	1 Day(s)	0.38 ml	LITE Element - Correction after ICP		2.0	microgram/L
Tin	0	microgram/L	0.1	microgram/L	Barely Detectable	Daily maintenance recommended		0.04 ml	PRO Element - Daily dosage, adjustment as per ICP	Start with a daily dose of 0.1 µg/L and watch ICP trend	0.1	microgram/L

Brightwell -P Powder

I recommend downloading the latest version and save it on your Personal computer. It is Excel based, and MAC computer would use Google sheets to open the Excel sheet.

Most important is now to enter the correct amount of system water volume in the top area. Consider the Water volume only, with no rocks and no substrate. The more accurate the better.



Correction dosages :

There are 2 fields that the Reefer would need to fill out for each element that need a correction. The current value that is measured and provided as part of the ICP result, as well as the Target value.

By default, I kept the field where the target value will be entered, intentionally empty to avoid an accidental incorrect dosing and to force the Reefkeeper to be familiar with the target values.

For example, the Barium level in the ICP measured 8.20 microgram/L. You will later see in this guide that the Reef Moonshiner target level is 15 microgram/L.

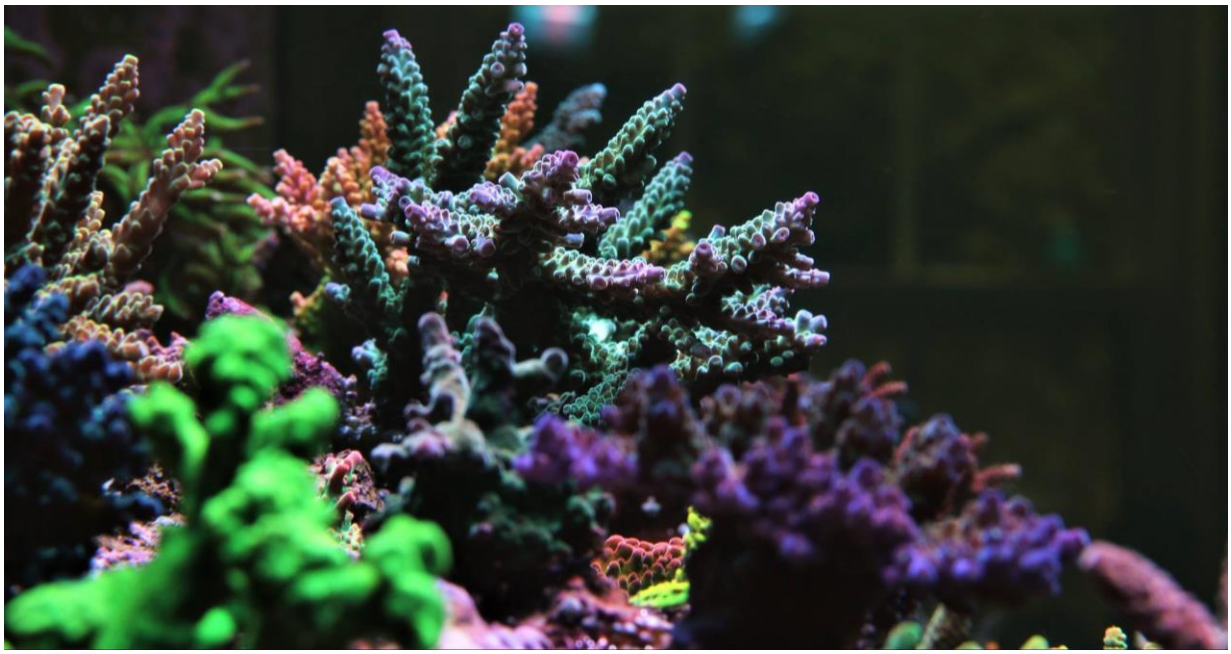
The cell with the current value will be filled with 8.20, and the cell with the Target entry will be filled with the value of 15. That's it! The Calculator will then show you the required amount of Reef Moonshiner solution, that need to be dosed to correct this deficit. Depending on the Tank size and required correction, the calculator will also tell you for how many days a certain element need to be dosed in case the daily maximal correction is exceeded which spreads the total amount of solution into multiple days. If the calculator only requires you to dose for 1 day, the correction is immediately done after the first dosage.

Reef Moonshiner's Minor Trace Elements					Correction dosage recommendation		
Trace Element	Current I Unit	Target	Unit	Recommended Target Level	Correction dosage daily (ml)	Correction dosage for day(s)	Total Required Solution [ml]
Barium	8.2 microgram/L	15	microgram/L	15.00	**25.74** ml	**1** Day(s)	**25.74** ml

FOR INFO

To minimize a mix up of the Target levels and incorrect entry in the target field, the recommended Target levels are shown for info right next to the cell where the targets are to be entered. However, attention is required when using the calculator.

This procedure will now be performed for all Trace elements that need correction.

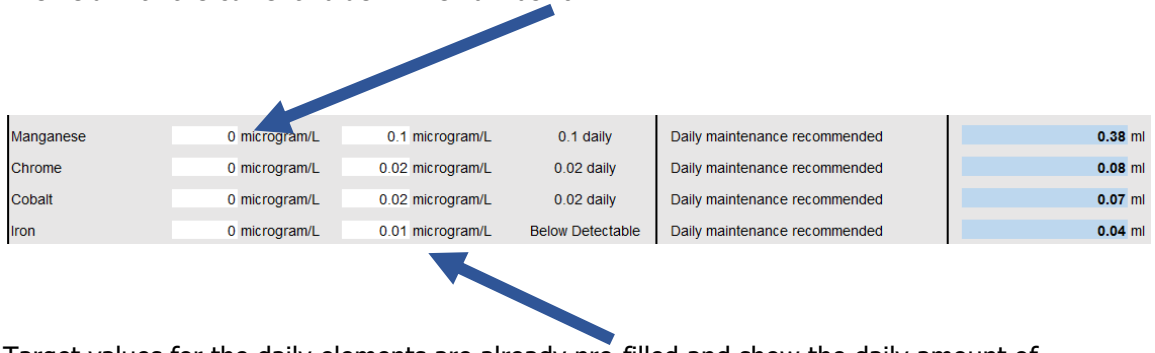


Daily Elements dosages :

For daily elements, and only if not detected on the ICP results, the following will be done to determine the daily dosages.

For the daily elements, no entries will need to be done!!! The daily amounts of Traces are pre-defined and won't need editing. Just simply read out the daily amount of liquid to be dosed if the System Water Volume on the top is correctly entered.

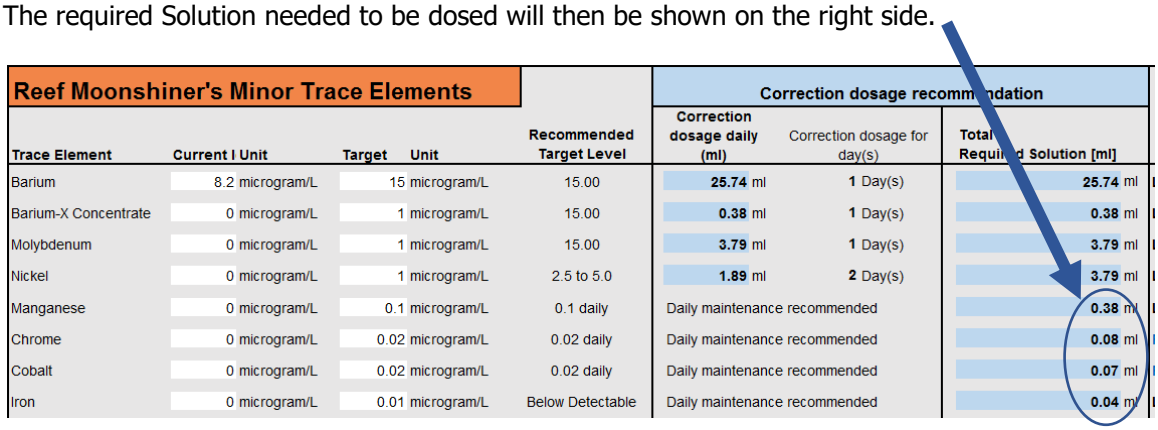
The field with the current value will remain as "0".



Manganese	0 microgram/L	0.1 microgram/L	0.1 daily	Daily maintenance recommended	0.38 ml
Chrome	0 microgram/L	0.02 microgram/L	0.02 daily	Daily maintenance recommended	0.08 ml
Cobalt	0 microgram/L	0.02 microgram/L	0.02 daily	Daily maintenance recommended	0.07 ml
Iron	0 microgram/L	0.01 microgram/L	Below Detectable	Daily maintenance recommended	0.04 ml

Target values for the daily elements are already pre-filled and show the daily amount of elemental trace, that we will dosed per day. Unless you want to experiment with higher dosages of the daily amounts, there is no need to change these.

The required Solution needed to be dosed will then be shown on the right side.



Reef Moonshiner's Minor Trace Elements					Correction dosage recommendation		
Trace Element	Current I Unit	Target Unit		Recommended Target Level	Correction dosage daily (ml)	Correction dosage for day(s)	Total Required Solution [ml]
Barium	8.2 microgram/L	15 microgram/L		15.00	25.74 ml	1 Day(s)	25.74 ml
Barium-X Concentrate	0 microgram/L	1 microgram/L		15.00	0.38 ml	1 Day(s)	0.38 ml
Molybdenum	0 microgram/L	1 microgram/L		15.00	3.79 ml	1 Day(s)	3.79 ml
Nickel	0 microgram/L	1 microgram/L		2.5 to 5.0	1.89 ml	2 Day(s)	3.79 ml
Manganese	0 microgram/L	0.1 microgram/L		0.1 daily	Daily maintenance recommended		0.38 ml
Chrome	0 microgram/L	0.02 microgram/L		0.02 daily	Daily maintenance recommended		0.08 ml
Cobalt	0 microgram/L	0.02 microgram/L		0.02 daily	Daily maintenance recommended		0.07 ml
Iron	0 microgram/L	0.01 microgram/L		Below Detectable	Daily maintenance recommended		0.04 ml

Example is the daily Manganese. We intend to dose daily an amount of 0.1microgram/L of Manganese as a default, which is 0.0001ppm Manganese daily. Doesn't sound much, however you will see a big difference in your macroalgae and coral fluorescence if applied.

IMPORTANT

If a user like to double the amount of daily Manganese, he would enter 0.2microgram/L in the target cell, to see how much ml of dosing solution will be required daily.

Iodine and Vanadium are daily elements as well,

but are handled in a different way which is explained in more details in this guide.

Dosing monthly/quarterly - Rubidium

Make sure you have entered the correct system water volume in the top of the Moonshiner calculator!

Dosing Rubidium is basically a correction dosage, but on either a quarterly or monthly basis. The initial dosage when the system is started is the assumption that Rubidium is depleted which is usually the case in almost all tanks.

The initial dosage is 0.2mg/L and then 0.1mg/L quarterly or 0.033mg/L on a monthly basis.

In order to identify how much Rubidium solution is required, the current value cell is filled with "0" and the target level cell is filled with the desired supplementation of the element, means 0.2 at the first time, then 0.1 if you do it quarterly or 0.033 if you do it monthly.

The calculator will tell you if you can do the correction on a single day or if you need to spread it out.

I recommend performing the maintenance dose on monthly basis.

Initial dosage on a 100G system

Reef Moonshiner's Major Trace Elements						Correction dosage recommendation		
Trace Element	Current Level	Unit	Target Level	Unit	Recommended Target Level	Correction dosage daily (ml)	Correction dosage for day(s)	Total dosage of Required Solution [ml]
Rubidium	0	mg/L	0.2	mg/L	0.1-0.2	**37.85** ml	**2** Day(s)	**75.71** ml

Quarterly dosage on a 100G system

Reef Moonshiner's Major Trace Elements						Correction dosage recommendation		
Trace Element	Current Level	Unit	Target Level	Unit	Recommended Target Level	Correction dosage daily (ml)	Correction dosage for day(s)	Total dosage of Required Solution [ml]
Rubidium	0	mg/L	0.1	mg/L	0.1-0.2	**37.85** ml	**1** Day(s)	**37.85** ml

Monthly dosage on a 100G system

Reef Moonshiner's Major Trace Elements						Correction dosage recommendation		
Trace Element	Current Level	Unit	Target Level	Unit	Recommended Target Level	Correction dosage daily (ml)	Correction dosage for day(s)	Total dosage of Required Solution [ml]
Rubidium	0	mg/L	0.033	mg/L	0.1-0.2	**12.49** ml	**1** Day(s)	**12.49** ml

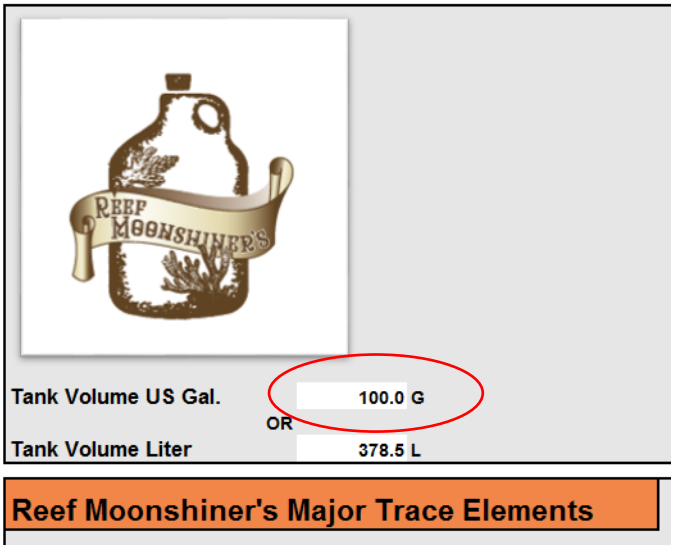
Here are some more details about the calculator and how it works.

It's actually easy to use, even while it looks pretty complex at the first sight.

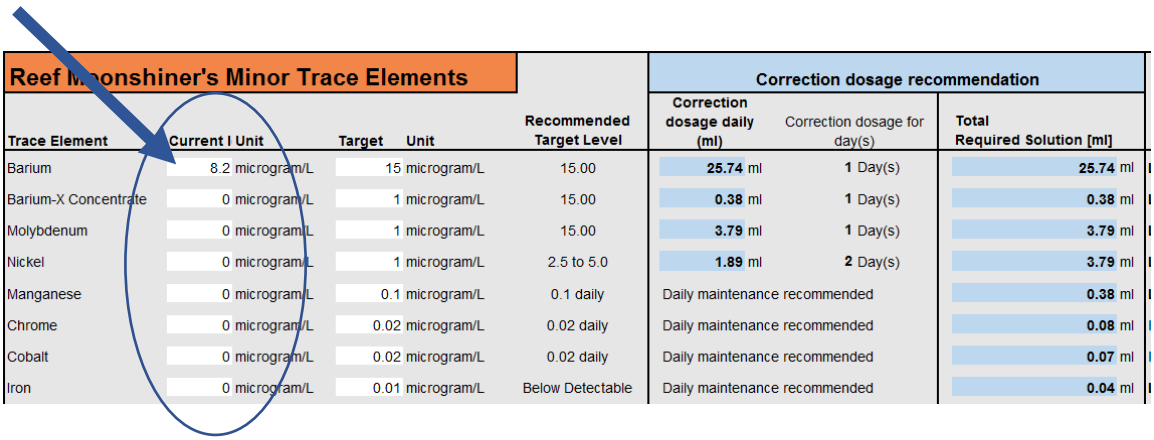
Data entry

Most important is to enter the correct system volume at the top of the calculator. Deduct all rocks and sand and try to estimate as good as possible the Water volume of the tank.

Enter the Volume in the top.



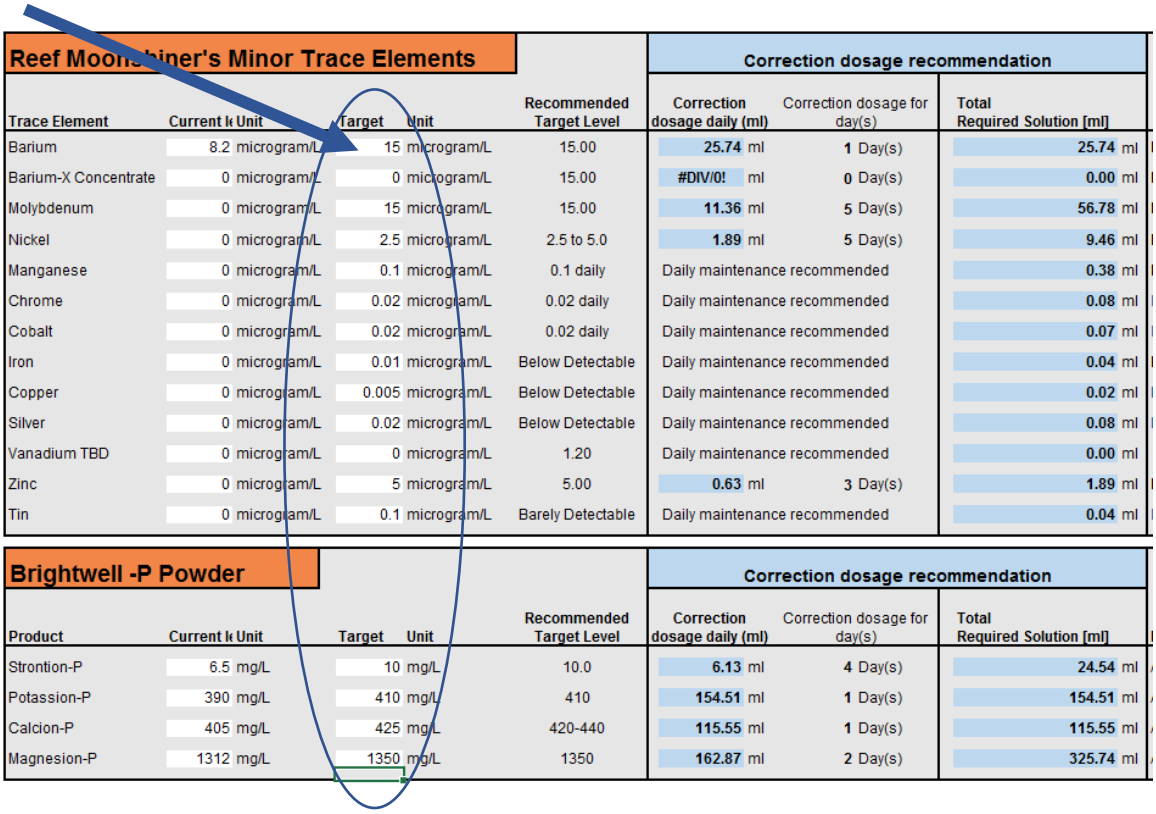
Simply add the measured value from the ICP result into the cell in the column E, "Current level". Only do this for the elements that need correction, basically the elements that have been measured below the recommended target levels.



Reef Moonshiner's Minor Trace Elements					Correction dosage recommendation		
Trace Element	Current l Unit	Target Unit	Recommended Target Level	Correction dosage daily (ml)	Correction dosage for day(s)	Total Required Solution [ml]	
Barium	8.2 microgram/L	15 microgram/L	15.00	25.74 ml	1 Day(s)	25.74 ml	
Barium-X Concentrate	0 microgram/L	1 microgram/L	15.00	0.38 ml	1 Day(s)	0.38 ml	
Molybdenum	0 microgram/L	1 microgram/L	15.00	3.79 ml	1 Day(s)	3.79 ml	
Nickel	0 microgram/L	1 microgram/L	2.5 to 5.0	1.89 ml	2 Day(s)	3.79 ml	
Manganese	0 microgram/L	0.1 microgram/L	0.1 daily	Daily maintenance recommended		0.38 ml	
Chrome	0 microgram/L	0.02 microgram/L	0.02 daily	Daily maintenance recommended		0.08 ml	
Cobalt	0 microgram/L	0.02 microgram/L	0.02 daily	Daily maintenance recommended		0.07 ml	
Iron	0 microgram/L	0.01 microgram/L	Below Detectable	Daily maintenance recommended		0.04 ml	

Now fill the column H, "Target level" with the required value which is the recommended target level. The recommended target level is shown in the Self-Assessment section as well shown for information in the Calculator column K, "Recommended Target level".

The target level field is kept empty on purpose to minimize errors on the dosing routine.



Reef Moonshiner's Minor Trace Elements

Trace Element	Current le	Unit	Target	Unit	Recommended Target Level	Correction dosage daily (ml)	Correction dosage for day(s)	Total Required Solution [ml]
Barium	8.2	microgram/L	15	microgram/L	15.00	25.74 ml	1 Day(s)	25.74 ml
Barium-X Concentrate	0	microgram/L	0	microgram/L	15.00	#DIV/0! ml	0 Day(s)	0.00 ml
Molybdenum	0	microgram/L	15	microgram/L	15.00	11.36 ml	5 Day(s)	56.78 ml
Nickel	0	microgram/L	2.5	microgram/L	2.5 to 5.0	1.89 ml	5 Day(s)	9.46 ml
Manganese	0	microgram/L	0.1	microgram/L	0.1 daily	Daily maintenance recommended		0.38 ml
Chrome	0	microgram/L	0.02	microgram/L	0.02 daily	Daily maintenance recommended		0.08 ml
Cobalt	0	microgram/L	0.02	microgram/L	0.02 daily	Daily maintenance recommended		0.07 ml
Iron	0	microgram/L	0.01	microgram/L	Below Detectable	Daily maintenance recommended		0.04 ml
Copper	0	microgram/L	0.005	microgram/L	Below Detectable	Daily maintenance recommended		0.02 ml
Silver	0	microgram/L	0.02	microgram/L	Below Detectable	Daily maintenance recommended		0.08 ml
Vanadium TBD	0	microgram/L	0	microgram/L	1.20	Daily maintenance recommended		0.00 ml
Zinc	0	microgram/L	5	microgram/L	5.00	0.63 ml	3 Day(s)	1.89 ml
Tin	0	microgram/L	0.1	microgram/L	Barely Detectable	Daily maintenance recommended		0.04 ml

Brightwell -P Powder

Product	Current le	Unit	Target	Unit	Recommended Target Level	Correction dosage daily (ml)	Correction dosage for day(s)	Total Required Solution [ml]
Strontion-P	6.5	mg/L	10	mg/L	10.0	6.13 ml	4 Day(s)	24.54 ml
Potassion-P	390	mg/L	410	mg/L	410	154.51 ml	1 Day(s)	154.51 ml
Calcion-P	405	mg/L	425	mg/L	420-440	115.55 ml	1 Day(s)	115.55 ml
Magnesion-P	1312	mg/L	1350	mg/L	1350	162.87 ml	2 Day(s)	325.74 ml

Simply go through the list of corrections and ideally print out the sheet at the end to tick off the dosages that you have performed. Please read in the Dosing section of this guide, how to enter and handle the difference between "Correction Dosage" and "Daily dosage" described in greater detail earlier in this Guide.

For the daily elements, no entries will need to be done!!! The daily amounts of Traces are pre-defined and won't need editing. Just simply read out the daily amount of liquid to be dosed if the System Water Volume on the top is correctly entered.

The field with the current value will remain as "0".

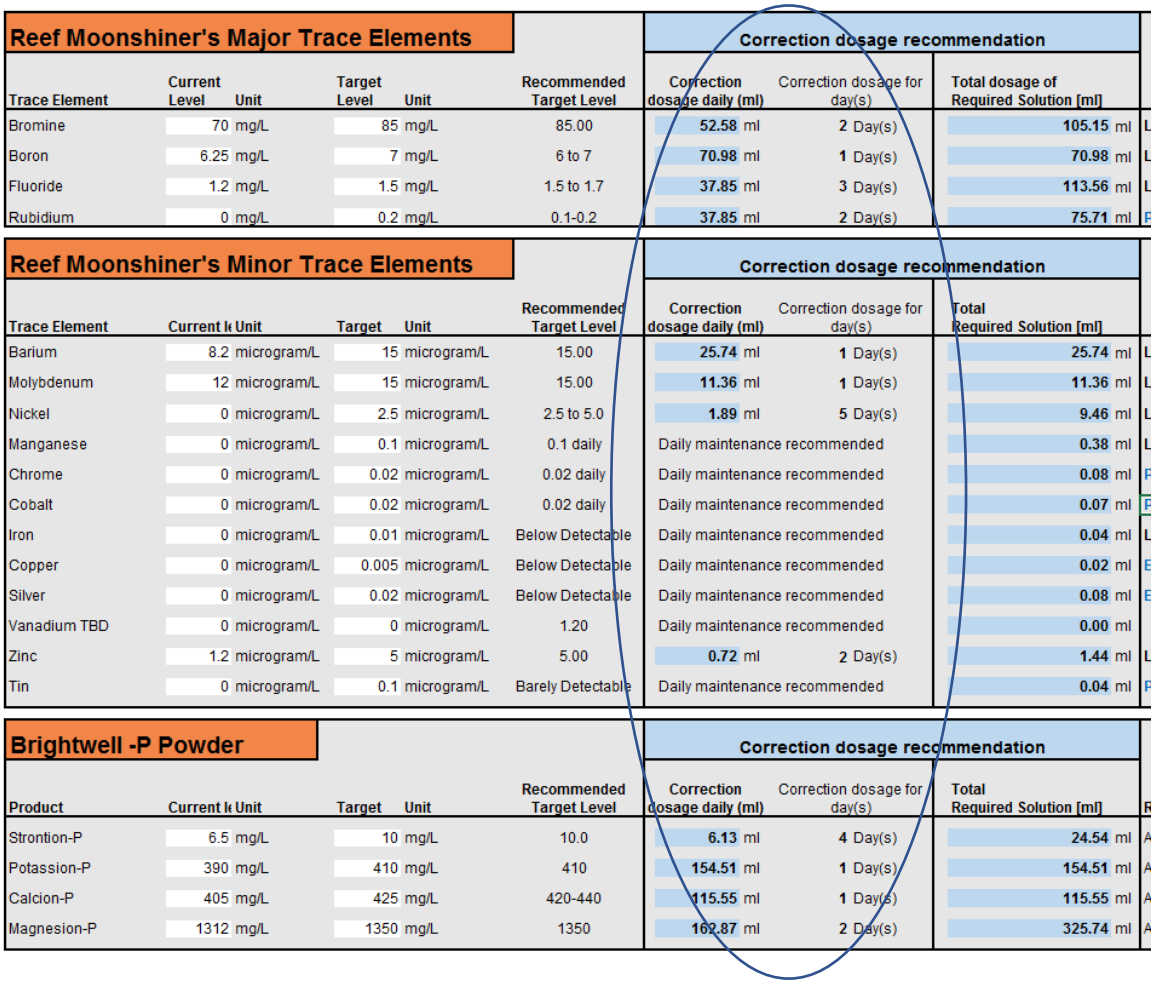
Reef Moonshiner's Minor Trace Elements

Trace Element	Current le	Unit	Target	Unit	Recommended Target Level	Correction dosage daily (ml)	Correction dosage for day(s)	Total Required Solution [ml]
Manganese	0	microgram/L	0.1	microgram/L	0.1 daily	Daily maintenance recommended		0.38 ml
Chrome	0	microgram/L	0.02	microgram/L	0.02 daily	Daily maintenance recommended		0.08 ml
Cobalt	0	microgram/L	0.02	microgram/L	0.02 daily	Daily maintenance recommended		0.07 ml
Iron	0	microgram/L	0.01	microgram/L	Below Detectable	Daily maintenance recommended		0.04 ml
Tin	0	microgram/L	0.1	microgram/L	Barely Detectable	Daily maintenance recommended		0.04 ml

Target values for the daily elements are already pre-filled and show the daily amount of elemental trace, that we will dose per day. **Unless you want to experiment with higher dosages of the daily amounts, there is no need to change these.**

Read out dosing amounts needed

The Calculator output data is relatively easy to understand.



Reef Moonshiner's Major Trace Elements

Trace Element	Current Level	Unit	Target Level	Unit	Recommended Target Level	Correction dosage recommendation: Correction dosage daily (ml)	Correction dosage for day(s)	Total dosage of Required Solution [ml]
Bromine	70	mg/L	85	mg/L	85.00	52.58 ml	2 Day(s)	105.15 ml
Boron	6.25	mg/L	7	mg/L	6 to 7	70.98 ml	1 Day(s)	70.98 ml
Fluoride	1.2	mg/L	1.5	mg/L	1.5 to 1.7	37.85 ml	3 Day(s)	113.56 ml
Rubidium	0	mg/L	0.2	mg/L	0.1-0.2	37.85 ml	2 Day(s)	75.71 ml

Reef Moonshiner's Minor Trace Elements

Trace Element	Current l	Unit	Target	Unit	Recommended Target Level	Correction dosage recommendation: Correction dosage daily (ml)	Correction dosage for day(s)	Total Required Solution [ml]
Barium	8.2	microgram/L	15	microgram/L	15.00	25.74 ml	1 Day(s)	25.74 ml
Molybdenum	12	microgram/L	15	microgram/L	15.00	11.36 ml	1 Day(s)	11.36 ml
Nickel	0	microgram/L	2.5	microgram/L	2.5 to 5.0	1.89 ml	5 Day(s)	9.46 ml
Manganese	0	microgram/L	0.1	microgram/L	0.1 daily	Daily maintenance recommended		0.38 ml
Chrome	0	microgram/L	0.02	microgram/L	0.02 daily	Daily maintenance recommended		0.08 ml
Cobalt	0	microgram/L	0.02	microgram/L	0.02 daily	Daily maintenance recommended		0.07 ml
Iron	0	microgram/L	0.01	microgram/L	Below Detectable	Daily maintenance recommended		0.04 ml
Copper	0	microgram/L	0.005	microgram/L	Below Detectable	Daily maintenance recommended		0.02 ml
Silver	0	microgram/L	0.02	microgram/L	Below Detectable	Daily maintenance recommended		0.08 ml
Vanadium TBD	0	microgram/L	0	microgram/L	1.20	Daily maintenance recommended		0.00 ml
Zinc	1.2	microgram/L	5	microgram/L	5.00	0.72 ml	2 Day(s)	1.44 ml
Tin	0	microgram/L	0.1	microgram/L	Barely Detectable	Daily maintenance recommended		0.04 ml

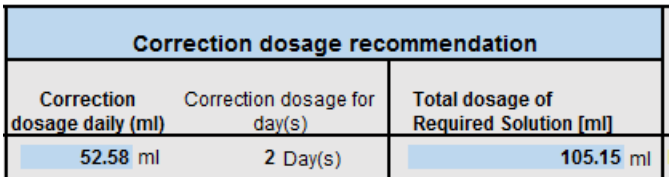
Brightwell -P Powder

Product	Current l	Unit	Target	Unit	Recommended Target Level	Correction dosage recommendation: Correction dosage daily (ml)	Correction dosage for day(s)	Total Required Solution [ml]
Strontion-P	6.5	mg/L	10	mg/L	10.0	6.13 ml	4 Day(s)	24.54 ml
Potassion-P	390	mg/L	410	mg/L	410	154.51 ml	1 Day(s)	154.51 ml
Calcion-P	405	mg/L	425	mg/L	420-440	115.55 ml	1 Day(s)	115.55 ml
Magnesion-P	1312	mg/L	1350	mg/L	1350	162.87 ml	2 Day(s)	325.74 ml

For corrections, the Calculator is giving the required amount of solution in ml per day, as well as for how many days this amount is required to be dosed to complete the Correction.

In certain cases, the required corrections are so large, that the correction need to be spread out over multiple days. In the below example you can see that a few element corrections are done over the period of a few days.

On the right side of this section, "Total Required Solution", this field is calculating the amounts per day multiplied by the duration to give an overview how much solution is required in total for the correction. This helps in advance to determine how much solution and hence bottles are required on larger tank system.



Correction dosage recommendation		
Correction dosage daily (ml)	Correction dosage for day(s)	Total dosage of Required Solution [ml]
52.58 ml	2 Day(s)	105.15 ml

For **Corrections** you see:

- Amount per day
- Days to be dosed
- Total solution dosage needed for the correction (for evaluation how much Liquid is required)

Correction dosage recommendation		
Correction dosage daily (ml)	Correction dosage for day(s)	Total Required Solution [ml]
18.93 ml	2 Day(s)	37.85 ml
0.38 ml	1 Day(s)	0.38 ml
9.46 ml	2 Day(s)	18.93 ml
1.89 ml	5 Day(s)	9.46 ml
Daily maintenance recommended		0.38 ml
Daily maintenance recommended		0.08 ml
Daily maintenance recommended		0.07 ml
Daily maintenance recomm		0.04 ml

Daily element dosages are shown in the table "Total Required Solution" and will be dosed daily as described earlier in this guide if not detected in the ICP results.



Even some simple Orange Ricordea can look insane when supplemented with metals and daily routine under this method.

Bonus and Troubleshooting

The below section may be expanded in future revisions and has some useful information for mainly applying this method along with Water change free systems and very common trouble that prevents the Tank system to thrive.

Water Change free Tanks

Take time to read this completely.

I want to take a moment to inform a bit about the results and would like to give a bit personal recommendation to further improve colors and growth for the Moonshiner users that do not perform Water changes anymore with extreme great results.

The midterm experience generally from going Water change free, while applying the Reef Moonshiner's method, and in certain cases the addition of advanced Trace Elements such as Chromium, Zinc, Rubidium, Cobalt etc. is, that these systems thriving even better and look even more colorful compared to systems that still perform Water changes on a routine basis.

So why may that be and why is that a good thing???

Well, the facts we can clearly identify is that first at all, the WC does shock the tank in some way no matter what.

We may not notice it, but with most salts we cause with every Water change a chemical change in the ALK level, impact on Trace Elements and also an instantly happening chemical oxidation process of the new introduced chemicals since many folks do not really let the fresh saltwater settle for 2 days or so. This will have a small effect on the biology as well.

That said, it most likely won't really harm the tank, but it seems that WC free systems enjoy the fact of even more stability by not having this change on a weekly or biweekly basis. Stability is higher for sure. To be fair, first larger correction dosages when starting the Reef Moonshiner's method, do a similar thing at least on the Trace Elements. However, tank systems that run on Calcium reactors usually do require much smaller corrections once a month or bimonthly to maintain the Moonie Target levels, hence the change in the chemistry is reasonable lower that I personally don't see a throwback for a short period as I do saw it with WC's.

The most avoidable change on the water is the change in ALK, and that you can't really avoid with WC's.

You may be able to match the ALK level, however the ratio of sodium carbonate and bicarbonate within the water, we can't match to the tank.

In a nutshell, higher stability is the first benefit. Second is the fact of less maintenance and cost.

Salt is costly, RODI water costs since it depletes your RODI resin and wears out the RODI system faster when doing WC's.

Time to do the preparation and all the spills and trouble we usually experience when doing the WC, we all know that for the most part, lol. Even while some folks have an extremely well-established process for the WC, there is once a while always something that goes wrong while work or family life comes across. So for many a WC is still a pain in the bun!

Personally, I enjoy the fact of not doing a Water change anymore, I rather use the time for fragging ;-)

A third considerable fact is that with no more WC, and that is a big argued fact, we do not introduce certain elements that can be considered as not as beneficial elements or impurities! Means these impurities such as copper, titanium, selenium, arsenic or certain other chemical elements, that are a trace element on one end, but an undesired trace for our purpose. On the other side while leaving these undesired elements out of the supply chain, we have natural consumption or oxidation going on in the tank at the same time. So the way I see it, similar to heavy detoxifying filtration methods such as Zeolite methods, we stop the introduction and consume whatever is in the tank at the same time, causing a depletion of the undesired minor elements!

Well, as a matter of fact some of these traces likely have a need in the biology and micro fauna in our Mini Reefs which we likely almost eradicate by not doing a WC, and many scientists claim that all these elements are needed as well in a healthy reef tank! Agree, I do believe this too! For example, some good salts, which are artificially blended, have at the end about 70-80 measured chemical elements in the final water sample. That sounds a lot, however these "side" traces are not necessarily intentionally blended into the salts, more likely these are brought in as impurities as part of the used chemicals to mix and blend the final salt mix! At this point, I can assure you that there are impurities in the Moonshiners ingredients as well, however these are so extremely low that it will probably take another decade to have ICP's that will be able to detect elements in these low ranges, due to the fact of using very high purity ingredients ;-)

Anyways, there are many overseen ways, these mostly undesired elements but likely needed elements, find their way into our tanks in the desired amounts! Number one factor for this is the daily food we put in our tanks. You won't believe how many traces are included in fish and coral food which will partially being released in the water directly after feeding due to decomposition or will be released into water after digestion by fish and other microorganism at the end. That is actually the theory and purpose of many advanced reefer to feed their tanks a lot while doing no water change. However, for me the uncontrolled addition of elements via food is not the optimal solution but work in many cases to some extent.

Summary of this third fact and message is I like the benefit of natural reduction of undesired elements but maintain these somewhat via addition of minor traces via foods rather than through WC's and we can assume this will take care of all the unconsidered elements we can't and don't dose via a Trace element addition.

What is the culprit of a Water change free tank???

With all these advantages and maybe more which I haven't mentioned above, there are certain benefits from WC's that we don't have if we avoid WC's.

The major advantage is the partial export of certain "ingredients" in the matured reef tank we cannot remove and cause issues long term. To name a few, here a short listing of the most concerning ones to me:

- Medications

- Artificial introduced chemicals that normally do not belong ideally in a marine environment from equipment materials and household chemicals we use

- Gelbstoffe (yellowing compounds in water)

- Accumulation of numerous Acids

- Toxins

- Large Organic compounds

Medications come into the tank through treatments and even coral dips we do in our Reefer life.

Not to mention medications the Reefer takes as human, and introduces those to the tank through sweat and skin contact, this by the way works in both directions!

Chemicals from equipment, pipes and pumps will find its way via natural or chemical oxidation processes, as well the Reefers hand that has been exposed to household chemicals are unavoidable. In theory they may never become a problem, but realistically it's a clock that is ticking.

Gelbstoffe, the stuff that is causing the yellow tint for example requires some sort of exportation either via WC or Absorption or via oxidation which can be achieved partially via UV or Ozonization. Ozonization and UV require still some sort of export via a secondary media in one or the other way and can fill a book ;-)

Anyways, these yellow compounds accumulate and will for sure shift the light spectrum we pay so much for, and will reduce the amount of light, that our corals need, and we pay so much attention to, via PAR meter measurement and spend tons of money for bulbs and light fixtures. A skimmer alone will not be able to remove these yellow compounds, hence some sort of export is required on the long run. Gelbstoff(e) btw. is a german word that is even used in the English speaking world of science a lot.

Acids in the water are mostly a result of amino acids and large variety of biological processes as well as a waste product from supplements, Co2 systems and many more ways. There is only an effective way of exporting those, since natural breakdown isn't fast enough, and skimming doesn't reduce these efficient enough if at all anyways.

Reduced acids in the water usually cause much better PE and better and stable PH, as well a more stable ORP level.

The result is at the end a healthier coral in our favor. Exporting acids is somewhat counterproductive, since while we are exporting excessive acids, we partial remove as well the fresh introduced Amino Acids or Humic Acids for detoxification treatments. But the greater benefit of reducing excessive acids should prevail.

Toxins, these can cause a lot of headache (actually literally), specifically in mixed reefs where you keep Acros and certain Softies all together.

I do see also SPS growing into each other and fighting for room, encrusting bases sliming off at the border of the encrusting base, making space by toxifying and killing the surrounding area to make room for expansion.

All these toxins itself we can't measure and do not really take them into account. Especially Zoas are known for their strong toxins, we all heard the stories and about the issues those toxins have caused. And every owner of a Gold Torch has seen the destruction when the coral reached out to their SPS neighbors. This is a great point of improvement when removing these toxins that accumulate in our tank.

Large organic compounds are partially not been able to be skimmed out and bacteria are usually can only breakdown larger organic compounds after a long time of degradation, means they will accumulate in a tank usually since the breakdown of these larger organics will take longer to be able to be available/consumed by bacteria. Larger organics can be either mechanically filtered, absorbed or broken down to small organics via Ozonization.

So how to remove them effectively???

I have done testing for a while now and came to the conclusion that for Reef systems that do apply the Reef Moonshiner's Trace element supplementation method, the use of specific activated carbon in a fluidized reactor is a great addition and provides even better results to tackle the above problems in WC free tanks.

With the known Pros and Cons of using activated carbon use, and using the Moonshiner's, the most concerning issue of Trace Element absorption and depletion by the carbon is very little and reasonable, considering the benefits it brings along.

I was never a fan of long term activated carbon use, but with the now continuous monitoring of Trace elements in a Reef System and the effect of activated carbon on those, it brought a big amount of clarity on this subject and what to look out for to make it work.

How to apply this???

Well, I recommend utilizing "Pelletized" activated carbon such as from Polyp Lab or Korallenzucht which I have made the best experience with. Other brands will work too, but I haven't tested those. I simply use in the beginning a smaller amount (for the below described reasons to avoid bleaching) of activated carbon in a fluidized reactor in bypass of the sump system. The pellets should not tumble to avoid grinding and carbon particles to get into the tank system as much as possible.

The carbon will remain for now for a month in the system until fully replaced with a new batch.

How much to use???

In the beginning and depending on how much yellow you see in the water, I use 150ml carbon for ea 100Gallon tank system water for a week and add another 150ml pellets after the first week. This will help to slowly adjust the corals to the improved light conditions.

I recommend watching the corals closely in the first few days and even reduce light intensity and photo period to be safe.

After a month, when you replace the carbon, you would replace all carbon with the final amount of 300ml pellets for every 100Gallon of system water volume.

The slower you start to initiate the carbon the better…., does apply to the first use and introduction of activated carbon!

Flow in the reactor shall not be too less, better higher flow, to reduce the contact time which will help to prevent light shock and slows down the absorption, however, avoid tumbling. A good measure is to stick a white paper on one end of the tank and watch daily how the yellow starts to disappear and to become less.

What are the disadvantages of Carbon use???

A few things being said honestly is that good quality carbon pays out, hence the maintenance cost of carbon to be used must be considered. Using pelletized carbon on the long run, it is beneficial and cost effective to buy the larger quantities offered by certain vendors.

A big issue is the initial potential for bleaching due to the light shock. I really warn you not to underestimate this effect.

Take it slow and the mentioned steps here should allow to avoid this effect.

Since activated carbon is known to absorb certain trace elements, which is true, you will find out that certain Reef Moonshiner elements, but mostly Nickel, Zinc and Iodine will decrease faster than normal. I did not find it necessary to perform a shorter testing cycle and the reductions were not really concerning high, hence corrections on most traces were not high, some did not seem to be affected at all. Iodine is one of the elements that dropped most and hence the daily drops the Moonie have to supplement, will have to be increased based on the carbon brand, batch and system behavior. Means you likely have to readjust the Iodide dosing routine after the ICP.

Certain activated carbon Brands will release some Phosphates, one more one less. That may not be a problem, maybe even a more welcome effect on ULN systems, but depending on the Po4 levels, this need to be accounted for. In my cases the Po4 release was slightly noticeable, however the increased bacteria biology adapted pretty fast to it, so it wasn't something I had to worry about. However, I mention this here. I used for comparison a cheap pelletized activated carbon with the results of increasing Po4 about 0.1ppm, which is a lot! The brand really counts.

Another welcome effect for ULN systems is that the activated carbon reactor in a fluidized reactor becomes bioactive and will release and produce some nitrates after a week or two. Systems with elevated nitrates may not like that fact too much.

On the other side, in certain systems that have issues with Nitrate reductions, high nitrates and the tank biology, it may be that some of the earlier listed problems are contributing to a non-well-functioning biology. The increase of Nitrates is comparable to a filter sock that is not been washed out monthly ;-)

What to expect after introducing the carbon???

Ok, so if you have followed the directions and slowly applied the carbon in the described way, the results should show from day to day an improvement on the overall appearance of the corals!

If they do not look better from that point on, something is considerable going into the wrong direction.

That can be the result of depletion of Iodine, which in theory could happen if your iodine level was very low to begin with.

Bleaching of Corals and tips, from Light shock is issue number one. By the way, Corals in low levels of Iodine do react quicker with Light shock than in tanks with moderate to high Iodine levels.

If a tank, and you can check your last ICP trending, with less than 30microgram/L starts the carbon, I would be careful since it may drop your tank into the depletion range.

Polyp extension will improve within a few days, if no Light Shock did happen.

Overall shimmer of Corals will improve, certain corals will have a bolder look in the blue and red colorations.

The overall tank appearance will improve, the water will look more crisp, however this should not happen instantly and ideally should take a few days to look really crisp. The final results on clarity you will see after the second week, when the carbon amount reached its full amount in the reactor.

When to start???

Tanks with lower Iodine levels as mentioned above, need to tackle Iodine levels first to be in the 45-60microgram/L range and use daily Iodide as described in the Reef Moonshiner method.

Recommendation is to introduce the activated carbon with the earlier mentioned and recommended Brands to be started 2 weeks prior taking the sample to send out the ICP. The time line would be then, introduction 50% carbon for a week, add 50% carbon for a week, taking the sample after total of 2 weeks, 2 weeks until results. Means the next ICP will tell you the effect on the tank after 2 weeks of carbon use and you can adjust from there and take correction as needed.

However, I leave it to you guys when to start, a tank with moderate to high Iodine levels and following the descriptions will most likely experience a smooth transition into a cleaner and healthier tank ;-)

When to replace???

Generally, I would say on a monthly basis, but you will see the discoloration on the tank water which will indicate that the carbon is exhausted. In reality, the first-time use is the worst for the carbon so the first fill in the first month, does have to absorb the most loading.

Another indication is the PH a lot of times. Due to less acids, the PH will start to increase over a few days. Saturation of the activated carbon can then also be noticed when the PH starts to drop from day to day, indicating raising acids again.

Can granulated carbon been used???

I would recommend sticking with pellets for the above mentioned risks and reasons for pellets.

Also be aware some carbons on the market are made out of coconut shell and absorb many more trace elements from what I have seen and increase the risk for bleaching. Avoid those types of Carbon.

Can we use pelletized carbon in bags???

Yes, it will be less effective and will take longer, but taking it slow is a benefit here.

I'm unsure if that will be able to be as effective on subsequent weeks as we like it to be.

Feedback is appreciated if you do it!

Can I do this even while continuing WC's???

Sure you can!

Low PH issues in Reef Tanks

Unfortunately, I do see recently a lot more tanks of the new Reefkeeper's generation that literally suffer from low PH, mostly due to excessive carbonic acids in the Water.

This effect is usually noticeable when the PH in the morning is below 7.8-7.85

Under consideration of a normal salinity range and average Alk level the normal Reefkeeper maintains, this indicates a high amount of trapped Co2 in the water.

As a result, the overall Reeftank biology and calcification processes are negatively impacted. Even worse, the majority of Corals will not be able to appear in the colors and beauty which they could show if they would be healthy, due to be in a Saltwater with lower carbonic acids.

Reason for this situation is that there is a significant imbalance of Co2 introduction versus degassing. The Co2 household is simply out of whack.

There are many ways how the Co2 will be introduced into the tank:

- Micro fauna, Algae and Corals itself will contribute to this effect during and after the Photoperiod, which there is nothing we can do about and it's part of the biological process of the Reef.
- Co2 rich Air Introduction into the Reeftank via Surface Agitation, Baffling, Waterfalls, Durso pipes, Surface movement wherever Water and Air is in contact with each other.
- Co2 Rich Air Introduction via Skimmer, Air Pump and Stones etc.
- Co2 as a utility used on Calcium Reactors
- Co2 as a waste gas from Biofilter systems
- Lot more ways to get it in …….

On the other side, and under normal circumstances, these are the ways the Co2 will be taken out of the Tank:

- Surface agitation on water surface, Overflows, Baffles, Skimmer – Gas exchange to environmental air.
- Absorption of Co2 from Algae and micro fauna
- Absorption from substrate – chemical reaction of carbonate with acids
- Minor consumption of Co2 from biological processes

Overall there are many more ways to introduce the Co2 into the tank, than ways to get it out.

The major and most beneficial way to reduce the Co2 out of the water is with surface agitation, waterfalls and overflows etc. However, these techniques have been reduced in the recent years to make Reeftank almost silent leading to a long term issue.

It must be understood, that the biggest issue on the Water to Air gas exchange is, that it can only work effectively if the environmental air for the Gas exchange is not supersaturated with Co2!!! You will see in a moment where this is going to.

The higher the used Room air Co2 concentration is, the less Co2 will be exchanged out of the water! Means low Co2 concentration in the air, big Co2 exchange and vice versa with high Co2 levels in the surrounding area, very little Co2 Gas exchange will happen.

Here some data:

Outside Air Co2 concentration is usually around 400ppm.

Your house will have likely a Co2 concentration of 600-800ppm of Co2 which is considered normal and a reasonable good gas exchange should be possible to maintain good tank PH with some additional measures I will detail out later.

Here the things we don't want to know! When I investigated the last 15-20 tanks with low PH issues where the classic way of Skimmer Air Co2 scrubbing did not help, including my own house, the Co2 concentration was in almost all cases measured in the range of 1,200ppm-1,500ppm !!!

This level is absolute not healthy for the Reeftank, and even worse, it also makes the people ill that have to live in this environment. Not to mention, these concentrations are inacceptable to any codes and conducts for safe work environments!!! Take this matter really serious!!!

First is to find out if the environmental Room air is really the big issue here. From experience I can say, that if the PH can be normalized into the daily range of 7.9 in the morning to 8.3 in the peak time of the day, the Co2 concentration might likely be in acceptable limits, in case the PH can be increased with these below corrections to increase the Tank PH. If not, you should invest in Co2 Handheld meter which is usually around $120-$150 from common online vendors. This will provide sufficient clarity if your house needs a corrective action on the Ventilation system.

Back to the balance of Co2 introduction and Degassing. Here are a few realistic actions than can be used to increase the PH on most tank systems.

PH Scrubbing of Skimmer Inlet air

Install a reasonable sized media reactor with Soda Lime on the Skimmer inlet. This will result in a very high efficient gas exchange in the Skimmer body, since the Air is now very low in Co2. Simple heh?

I personally recommend using the TLF Phosban 550 Reactor with Soda Lime from Shopmedvet.com available in single bags or canisters. If your media exhausts quicker than in two weeks, your room air may be supersaturated with Co2.

Use large diameter reactors to allow longer air/media reaction time, due to reduced velocity of airflow in the reactor itself.

Remove any silencers, which basically only drop the airflow through the system and with a reactor, there is no need for a silencer anymore.

If you want to increase the time the media will last, run an outside air supply to the scrubber, remember the outside concentration of Co2 is even lower than inside the house.

Running an outside air hose to the skimmer inlet can do the job in many cases even without scrubbing, however it's mostly not feasible to do so, and keep windows open all day long does not work either but may be a temporary solution.

Skimmer efficiency increase

Run as much air as possible through the skimmer with air inlet wide open.

Clean the Skimmer water/air diffusor as often as possible from salt creep. In air flow measurement on air inlets on a variety of skimmers, it's been found that the salt creep inside the diffusor reduces the air flow after 2-3 days by 30-40%.

Keep the diffusor clean or do one of these:

- Stop the Skimmer operation every 8 hours for a minute through a timer. In that minute the salt creep in the diffusor will melt due to the rising water and been flushed clean automatically when the skimmer turns back on.
- Install the Top off system water into the Air inlet right before the Diffusor. That will flush the salt creep away every time the ATO turns on. But watch the operation, the RODI water may affect the skimmer and does cause overflowing or extremely wet skimming for a period of time.
- Venturi skimmers can use the ATO water as well but you would need to turn off the skimmer pump automatically when the Venturi is being flushed to avoid overflowing the skimmer.

Enhance the Calcium Reactor system

Additional effluent chambers with calcium reactor media will reduce the introduction of fresh Co2 into the tank coming from the Co2 reactor.

Add a second Calcium Reactor with Calcium Reactor media but no Co2. This will increase the alkalinity levels of the effluent, increase the efficiency of the reactor system in a way that less effluent is needed than before due to higher alkalinity concentrations, hence less effluent needed to maintain tank Alkalinity.

Add a DIY aeration chamber where the effluent is aerated with scrubbed air and a wooden air stone. Tricky to build, since it requires overflow and degassing/emergency vent line.

Keep the Refugium on 24/7

Utilize the Co2 absorption from Chaeto and let the Refugium run 24/7.

Aerate the Overflow

Use a Hydroponic Air pump and use scrubbed Air and a few Wooden air stones such as used for Micro-nano-bubbling and aerate the Overflow chamber if you have one.

This will drive out a lot of Co2 out of the tank very efficiently.

Can also be done in the sump, but the higher the water column is the better.

Micronanobubbling

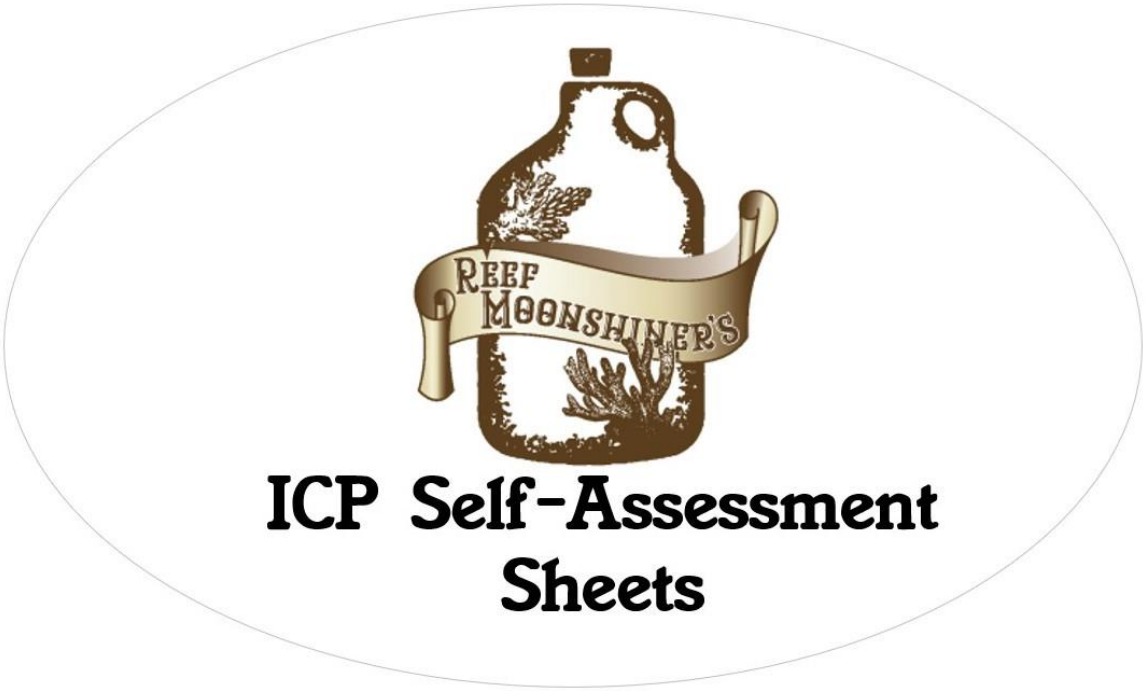
Apply Micro-nano-bubbling in the night. Search up Cruz Arias and his MBN method.

Utilization of higher ALK or Kalkwasser is not the solution !!!

Do **not** artificially use Kalkwasser or more Alk into the tank for higher PH, that does not remove the Co2 really out of the tank! Long story why.

Just increasing the PH with KW, Soda ash or other elements is just hiding the Co2 issue! Hope that makes sense to you.

The culprit is the Co2 balance in the system.



Self Assessment Sheets

The below Summary table's intention is to give a brief overview of the required Trace Elements target levels in order for the Reef Moonshiner's user to self-assess the ATI ICP Analysis results.

All Reef Moonshiner's Element dosages are to be determined with the latest revision of the Reef Moonshiner Dosing Calculator.

Alkalinity / Carbonate hardness

Target – 8 (+/- 0.5)

This target is a general recommendation and is user preference.

Magnesium

Target – 1350 mg/L

1250 and lower, to be corrected

1250-1350 is ok, bet correction to target level is recommended.

1400 and higher, reduce supplementation to settle tank into target range.

Sulfur

If elevated over 1000mg/L , watch ICP trend in subsequent tests.
Sulfur is typically elevated temporarily after Magnesium corrections with certain supplements.

Calcium

Target – 420 to 440 mg/L
400 and lower, to be corrected

400-420 is ok, but correction to target level is recommended.

440 and higher, reduce supplementation to settle tank into target range.

Potassium

Target – 410 mg/L
400 and lower, to be corrected

410-420 is ok, reduce supplementation to settle tank into target range.

500 and higher, recommend Water change to get at least below 500

Bromine

Target – 85 mg/L
65 and lower, to be corrected

65 is ok, bet correction to target level is recommended.

100 and higher, reduce supplementation to settle tank into target range, watch for certain Magnesium media in Calcium reactors, which may supplement excessive Bromine.

Strontium

Target – 10 mg/L
4 and lower, to be corrected asap

4-6 is ok, but correction to target level is strongly recommended.

8-10 is ok, but correction to target level is recommended to allow buffer.

10-20 reduce supplementation to settle tank into target range.

40 and higher, recommend Water change to get at least below 20-30

Boron

Target – 7 mg/L

3 and lower, to be corrected asap

4-5 is ok, but correction to target level is strongly recommended.

10 and higher, recommend Water change to get at least below 9/10

Fluorine/Fluoride

Target – 1.5 to 1.7 mg/L

1.0 and lower, to be corrected asap

1.0 – 1.2 is ok, but correction to target level is strongly recommended to allow buffer.

1.8- 1.9 reduce supplementation to settle tank into target range.

2.0 and higher, recommend Water change to get at least below 2.0 which causes irreversible tissue damage!!!

Lithium

Nominal range – 100-400 microgram/L

100 and lower, recommend being corrected

1000 and higher, recommend Water change to get at least below 900.

15% Water change each, will dilute about 10% of the measured level!

I have seen tanks with Lithium levels in the 1,500-1,900 microgram/L range with significant bleaching effects likely from this element. Careful, certain plastic bins from Home Improvement stores leech Lithium when filled with RODI.

Silicate

Nominal range – 100-200 microgram/L

If elevated verify the RODI results for incoming Silicates. You may want to use a Silicate Removal Resin as part of the RODI unit. I personally use the Spectrapure combination cartridge which is a mix of DI resin and Silicate remover which works very well and maintains low silicates.

Silicates are being consumed over time, watch subsequent ICP Test results.

Iodine

Target – 60-90 microgram/L

It is per the Reef Moonshiners method description recommended to dose Seachem Reef Iodide daily, no single time dosages!

Start with 2-3 drops of Iodide per 100G system volume, watch ICP results, and adjust accordingly until the tank is in the desired target range. Water changes also usually supplement some Iodide.

Iodide will convert to Iodine over time and is not immediately detectable.

0-20 is considered depleted, start dosing daily asap.

40 -50 is ok, but strongly recommend adjusting it to target levels via increased daily drops.

90 and higher, stop supplementation for a week and continue with reduced daily dosage while watch subsequent ICP's.

Take time to find the required daily dosage, and slowly adjust daily dosage from ICP to ICP!

Barium

Target – 15 microgram/L

6 and lower, to be corrected asap, considered depleted

8-10 is ok, but correction to target level is recommended to allow buffer.

20-50 reduce supplementation to settle tank into target range.

60 and higher, recommend Water change to get at least below 50

In certain cases, Barium is detected very low in the 2-5 microgram/L range. In those cases I recommend to temporarily increase the target level to 25, since the Corals tend to build in the fresh Barium into the existing skeleton which makes it stronger. This usually takes a few months and then the Barium levels normalizing to test results in the range of 10-12 microgram/L. That is the point where Barium targets can be set back to 15.

Molybdenum

Target – 15 microgram/L

6 and lower, to be corrected asap, considered depleted

10-15 is ok, but correction to target level is recommended to allow buffer.

20-30 reduce or stop supplementation to settle tank into target range.

50 and higher, recommend Water change to get at least below 40

Nickel

Target – 2.5 microgram/L

Usually if not supplemented in any way, this element is always depleted.

5 or higher, reduce supplementation to settle tank into target range.

Nickel higher than 20-30 indicates mostly corroding equipment in the tank.

Manganese

Daily supplementation as per Reef Moonshiners dosing calculator

Usually if not supplemented in any way, this element is always depleted.

If for whatever reason, the ICP detects this Element, supplementation is not required.

The Reef Moonshiner's method is considering this element dosed daily and it should not be detectable.

In the Dosing calculator, the default target level of 0.1 microgram/L daily, is a good starting dosage for most tanks. The amount can be slowly increased from ICP to ICP as long not detected, to determine the final daily dosage. Simply keep it undetectable and you know with your dosage calculation the daily Manganese supplementation.

It is open for experimental purpose to maintain a level of 5 microgram/L. Manganese is a metabolism Booster, positively influences the Fluorescence of SPS and supports Macroalgae growth.

Chromium

Daily supplementation as per Reef Moonshiners dosing calculator

Usually if not supplemented in any way, this element is always depleted.

If for whatever reason, the ICP detects this Element, supplementation is not required.

The supplementation is considering this element dosed daily for further enhancement and it should not be detectable while dosing.

In the Dosing calculator, the default target level of 0.02 microgram/L daily, is a good starting dosage for most tanks.

Going outside this dosage is experimental. Keep in mind Chromium can oxidize to a chemical state that it is not being consumed anymore and would accumulate over time in the tank, hence the above dosage is recommended.

Cobalt

Daily supplementation as per Reef Moonshiners dosing calculator

Usually if not supplemented in any way, this element is always depleted.

If for whatever reason, the ICP detects this Element, supplementation is not required.

The supplementation is considering this element dosed daily for further enhancement and it should not be detectable while dosing.

In the Dosing calculator, the default target level of 0.02 microgram/L daily, is a good starting dosage for most tanks.

Going outside this dosage is experimental. Cobalt seems to have a great positive influence on Soft Corals, however, too much Cobalt may depress the fluorescence of Corals, hence the low daily dosage.

Iron

Daily supplementation as per Reef Moonshiners dosing calculator

Usually if not supplemented in any way, this element is always depleted.

If for whatever reason, the ICP detects this Element, supplementation is not required.

The Reef Moonshiner's method is considering this element dosed daily and it should not be detectable.

In the Dosing calculator, the default target level of 0.01 microgram/L daily, is a good starting dosage for most tanks.

If Yellow SPS Corals develop a green shimmer, it's recommended to reduce the daily dosage.

If daily dosage is too small for a Syringe, then Drops should be used.

It requires testing and time to find the sweet spot of daily dosages. Iron and Manganese also are heavily consumed by Refugium algae, and every time the Refugium is harvested, the consumption will suddenly change.

SPS change color and adjust to Iron usually within a week time. This Element requires the most attention to find the best dosage.

Copper

Target – Not detectable

Usually if not supplemented in any way, this element is always depleted.

0-1 microgram/L indicates a Copper supplementation from certain GFO, food, medications, salt or materials used.

1-3 watch ICP trending, Fluorescence is affected.

3 and higher, recommend Water change to get at least below 3.

10% Water change each, will dilute about 10% of the measured level!

Element supplementation only for extremely experienced reefer, for experimental purpose!

Silver

Target – Not detectable

Usually if not supplemented in any way, this element is always not detected.

Element supplementation only for extremely experienced reefer, for experimental purpose!

May be useful and enhancing on Coral tanks, will keep you guys updated in the Reef Moonshiner's support group.

Vanadium

Target – 1-2 microgram/L

Usually if not supplemented in any way, this element is always depleted.

0-1 microgram/L seems to be a valuable supplementation, I personally use the Triton/Vanadium supplement with 1 drop/100Gallon per day to maintain the target level.

Zinc

Target – 5 microgram/L

Usually if not supplemented in any way, this element is always depleted.

1-3 is ok, but correction to target level is recommended

10-20 reduce supplementation to settle tank into target range.

40 and higher, recommend Water change to get at least below 20

Tin / Stannum

Daily supplementation as per Reef Moonshiners dosing calculator

Usually if not supplemented in any way, this element is always depleted.

5-30 investigate for corroding equipment or materials used. Watch subsequent ICP to see the trending of Tin, usually it disappears over time if not supplemented via salt, food etc.

If for whatever reason, the ICP detects this Element, supplementation is not required as of today.

The supplementation is considering this element dosed daily for further enhancement and it should not be detectable while dosing.

In the Dosing calculator, the default target level of 0.1 microgram/L daily, is a good starting dosage for most tanks. Tin is not available yet for public and is in the testing phase.

Going outside this dosage is experimental. Not too much is known about the effects of Tin, but it is recommended to dose daily in small amounts when going to the method of a Water change free tank system.

Aluminum

Target – 0-10 microgram/L

This is a pollutant from Al containing material, media, food and filter media

It is assumed elevated levels are having negative effects on fluorescence.

AL is consumed and reduced over time, watch ICP if elevated.

Levels up to 40-50 seem not to harm the tank system.

Above, it may be more beneficial to perform Water changes to dilute this Element.

Rubidium

Supplementation recommended as per Reef Moonshiners dosing calculator every 3 months or montlhy

Usually if not supplemented in any way, this element is always depleted over time but apparently very valuable to maintain at least natural seawater levels of 0.2mg/L

Very High Quality salts and All in one supplements include usually small amounts of Rubidium.

Unfortunately, Rubidium is not part of the ATI Test. Alternate ICP can be used to determine the Rb level to investigate the level in the tank. However, it usually is depleted to 0 from experience.

The supplementation of the Reef Moonshiner's is recommended in the following steps:

1st Initial dosage, first time use the target level of 0.2mg/L

Subsequent dosages – 0.1mg/L every 3 months or 0.033mg/L every month.

Certain users prefer the monthly dosage to be spread into a weekly dosage.

Going outside this dosage is experimental. Not too much is proven about the effects of Rubidium, but it is recommended to dose when going to the method of a Water change free tank system to maintain at least natural sea water levels and avoid at least complete depletion.

Personally, I have tested elevated Rubidium levels at 0.6mg/L detection levels with no more positive or negative effects.

Other Pollutants

Target – not detecable