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The official beginners guide to The TRITON method

The TRITON method beginner's guide

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This guide has been written with the aim of simplifying the TRITON method. The method itself can seem quite daunting at first, hopefully by the end of this guide you will see that you don't need a degree in chemistry to understand what is going on in your tank. This is not a comprehensive guide, more a highlights of things you should know and think about before you get started to prevent things tripping you up later down the road. Further more-detailed information can be obtained from the TRITON METHOD website www.triton.de.

What is the TRITON method?

The TRITON method is a "method to develop and permanently maintain a complete reef ecosystem in an aquarium".

So what does that mean?

To "develop" a complete reef ecosystem you must know what is happening with your water, and adjust your water to as near "Natural Sea Water" (NSW*) as possible.

*The "NSW" set points have been chosen by Triton after many years of testing of 1000's of water samples from around the world, some elements have been adjusted to suit the aquarium environment.

To "maintain" a complete reef ecosystem you must do just that, maintain, by ensuring that your water stays at as near to the chosen set points as possible.

How do we do this?

Testing
Dosing
Algae bed
Phosphate remover and Activated carbon
No routine water changes
Good Display Tank/Sump (Algae) lighting

TRITON Lab Testing

Offering comprehensive tests and professional analysis of your own water for you to be given information on the health of your system. This can be done as often or as little as you like and in turn this gives you information that you can use to remedy any discoveries highlighted. This can also be done to double-check items you feel are developing or either as periodic routine backup for preventive measures.

Testing involves sending a sample of your water to the TRITON lab for analysis. This is done by buying the pre-packaged kit from your Triton supplier, register with the TRITON-lab website and get your unique ID number, fill the phials (two phials with ICP) with your water and send it off (remembering to include the card and a large 1st class stamp).

There are two tests that can be carried out. The ICP OES and the HPLC.

The ICP OES (Inductively coupled plasma) is a scientific lab grade piece of equipment capable of testing your sample for the following elements... Don't panic, you do not need to understand them all!

Sodium (Na), Calcium (Ca), Magnesium (Mg), Potassium (K), Strontium (Sr), Boron (B), Bromine (Br), Sulphur (S), Lithium (Li), Beryllium (Be), Barium (Ba), Titanium (Ti), Vanadium (V), Chromium (Cr), Manganese (Mn), Iron (Fe), Cobalt (Co), Nickel (Ni), Copper (Cu), Zinc (Zn), Aluminium (Al), Silicon (Si), Arsenic (As), Antimony (Sb), Tin (Sn), Cadmium (Cd), Selenium (Se), Molybdenum (Mo), Mercury (Hg), Phosphorus (P), Phosphate (PO₄), Lead (Pb), Iodine (I)

The HPLC (High Performance Liquid Chromatography) is designed to take liquid samples and highly pressurizes them through various absorbency materials to a point where separation happens and can be measured. The following remaining elements are then measured.

Chlorine (Cl), Flourine (F), Nitrate (NO₃)

Macro-Elements









Element	Analysis	Setpoint	Deviation	Warning lamp	Liter	Dosage once / mL	Dosage daily / mL
Na	10026.00 mg/l	10700.00 mg/l	-674.00		650	0.00	0.00
Ca	493.10 mg/l	440.00 mg/l	53.10		650	280.61	0.00
Mg	1336.00 mg/l	1370.00 mg/l	-34.00		650	552.50	0.00
K	388.90 mg/l	400.00 mg/l	-11.10		650	92.50	0.00
Br	62.85 mg/l	62.00 mg/l	0.85		650	0.00	0.00
B	4.05 mg/l	4.50 mg/l	-0.45		650	73.13	0.00
Sr	6.23 mg/l	8.00 mg/l	-1.77		650	143.81	0.00
S	888.50 mg/l	900.00 mg/l	-11.50		650	0.00	0.00

Figure 1

You will receive an email when your results are ready to view, remember to check your junk folder! Typically the results are ready to view in 10 to 14 days.

Once you have your results (Figure 1, example of results) you will see what the concentrations of each element are and what they should be compared to the chosen set points. Your results will also come with an easy to understand traffic light system, green for good, yellow for caution, and red for action required. Should it be required you will be given a recommended course of action. This is cross-referred to the error correction sheet, which is a separate document available from the “downloads” section of the TRITON website.

An example of an error that needs correcting could be a build up of an unwanted heavy metal like copper, which is well known to be detrimental to corals and other invertebrates. The first action would be to try and locate the cause of the error, whether that be a broken piece of equipment or a piece of copper wire exposed to the water. Once the source has been found and removed then the remedial action should follow, in this case it would be a course of “Detox” followed by Carbon and water changes. If you cannot locate the copper source then it is quite possible that the contamination could come from food sources or other solutions that you may have been dosing previously.

The act of water changing is a very useful tool in the fight against accumulation, which is of course classed as an error. This is the only time that water changes should be carried out and you should only use good quality salts, TRITON’s own Pure salt which does not contain any other elements) or other well known brands. Bare in mind that many salt manufacturers run their salts at elevated levels so care should be taken in picking your brand.

Other remedial action may be additional dosing if one particular element is being taken up faster than others, this is explained more later.

You may require a few tests to be carried out at the beginning to aid error correction or to work out what your tanks consumption is for certain elements.

Dosing



Figure 2

The TRITON method is based around dosing 3* solutions called "Elementz Base". They are a collection of balanced elements and compounds designed to work hand in hand with each other to provide everything needed for the entire ecosystem, from the smallest microorganism to the corals and algae.

They come in 4 concentrated bottles that make up 3 x 10 litre solutions. 1, 2, 3a + 3b (Figure 2). Bottles 1 & 2 should be added to 9 litres of RO/DI water respectively and bottles 3a + 3b should be combined with 8 litres. It should be noted that only the best RO/DI water should be used in mixing the Elementz solutions with a TDS reading of 0. 10 litre containers are easily available through your LFS or TRITON supplier.



Figure 3

New Elementz bottles are now available (Figure 3) which come in white bottles instead of clear ones, the main difference is that Elementz 1 is now in a powder form to aid mixing, this should now be mixed with 8 litres of RO/DI then topped up to 10.

The solutions should be dosed into the return compartment of the sump (after the skimmer) and should have an interval between each of them to prevent the solutions reacting with each other. It is recommended to use an automated dosing pump for simplicity and to enable the solutions to be added throughout the day instead of all at once.

As with all methods stability is the key. This is achieved with TRITON by simply maintaining one parameter, Alkalinity. This is maintained at 8dKH, this in turn due to

the balanced nature of the Elementz solutions ensures that all of your other parameters remain as they should. Should your KH drop then you simply increase your dosage of the Elementz until the magic 8 is achieved, if it goes up then reduce the dose. It is important to note that you shouldn't obsess about achieving a constant reading of 8dKH, if your tank is maintained at a stable KH of 7.3 then that is just as good as 8. The stability is more important than the exact number!

With the unique combination of creatures in each tank means no two tanks will ever be the same, therefore just because one 200L system uses 50ml of Elementz another may only use 25ml as their stocking levels and inhabitants will be different.

From time to time you may find that one particular species uses up more of any one particular element, in this case individual dosing of that element can be carried out, these elements are known as the Trace Base. This is usually only apparent in larger systems. If you require to add Sr, K, or Mg then you will have to adjust the amount of Elementz 1 & 3 you dose as those elements are already present in Elementz 2. There is a handy calculator on the TRITON website to help with this.

You may also find that your Calcium or Magnesium start to rise due to the corals taking up excess Alk which of course makes you increase your dose. This can be remedied by reducing the dose of the relevant solution until the level drops back in line. Solution 2 for Ca, solution 3 for Mg.

As your dosage increases you may notice that your salinity starts to rise, this is due to the Elementz counteracting your automatic top up (ATU) if you have one. If this happens then it may become necessary to remove some of your tank water each day. Again a handy calculator on the TRITON website can help you with this.

**The Elementz solutions can also be used as 4 solutions keeping 3A and 3B separate and diluting them individually into 9 litres of RO/DI. This is available to be done if you find that A+B react with each other causing crystals to form.*

Algae bed / TRITON Sump

One of the most vital parts of the TRITON method is to have a healthy algae bed, this is achieved through the TRITON specific sump. The algae bed's main purpose is to remove nitrates (NO₃) and phosphate (PO₄) through the action of growing algae. The algae is also used as a catalyst for the Elementz, this means that the algae absorb the solutions as part of their metabolic process and convert them into amino acids, vitamins, sugars.

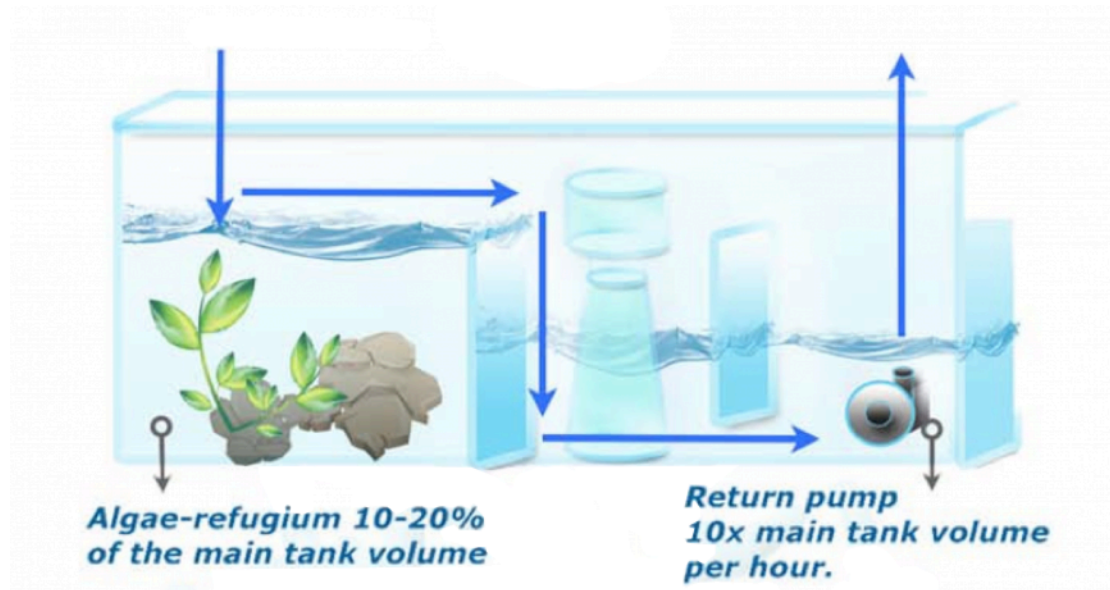


Fig 4. The recommended layout for the TRITON specific sump.

As you can see in Figure 4 the sump is split into 3 compartments. The algae/refugium compartment should be as large as can be achieved with a minimum size of 10% of the volume of the main display tank. It should house as many different types of algae as possible, as each different species of algae has different nutrient removal properties at different times. Some of the algae should be allowed to die back, it is during this process that the acids, vitamins, and sugars are released, this is why with the TRITON method we do not need and supplementary coral food.

It is also beneficial to have a few small pieces of live rock in there for the critters to hide in. There should be no sand bed in the algae/refugium compartment.

The water enters the sump directly into the algae/refugium compartment, TRITON do not recommend the use of filter socks/floss as they remove beneficial ingredients that the algae require. If detritus builds up excessively then this can be removed as and when required.

The water should leave the algae/refugium compartment over the first baffle and down into the skimmer compartment. You should have a strong skimmer rated to easily cope with the system requirements. You may find that as your system matures with the TRITON method your skimmer produces less waste, this is simply down to the fact that your tank has become more of a stable eco system and less of the micro organisms are dying unnecessarily. As the water leaves the skimmer compartment it should pass under the next baffle, this is to aid the skimmer having the most contact time with the proteins in the water as proteins rise. Additional baffles may be used as bubble traps and to maintain the water level in the skimmer compartment, without the additional baffle the water height would be set and maintained by the ATU float should you have one. The final compartment will house the return pump, reactors for Phosphate removal can also be housed in here. An additional ATU reservoir could be added if required.

The algae should be lit on a reverse cycle (Algae light comes on when main lights go out) to aid in preventing a PH swing occurring. TRITON recommends using T5's with a mix of the blue and white spectrum with a power of 0,06W to 0,08W per litre of the display tank's volume. As with everything though other light sources are available and great success has been had by people lighting the algae with CFL or Full spectrum LEDs for example.

One final consideration for the sump is the return pump, this should be capable of providing a minimum flow of 10x the volume of the system through the sump per hour taking into account for head loss and any taps for reactors etc. Too much flow through the sump could reduce the efficiency of the algae bed and the skimmer however.

TRITON does not recommend the use of UV sterilizers or Ozone. This is due to the fact that they do not differentiate between good or bad micro organisms.

Phosphate remover and Activated carbon

Phosphate remover does exactly what it says on the tin, removes phosphate. TRITON provide AL99 phosphate remover, this is an aluminum based "pellet" which is best used in a reactor. The AL99 should only have a slow flow passing over it and should not be "tumbled". You may find with continued use that your AL levels start to rise on your ICP test, if this is the case then it is recommended to alternate AL99 with an alternative product, there are many other Phosphate removal products available each with their own pros and cons...

Activated carbon is well known in the hobby for removing pollutants from the water and the TRITON method is no different. Carbon can be used in it's own reactor or simply in a bag in an area of good flow.

No routine water changes

One of the most popular parts of the TRITON method is the removal for the need of routine water changes.

As previously mentioned the act of water changing should still be retained as a useful tool if any remedial action is required for example accumulation of excess elements. However, again it is essential that known good salts be used.

The act of using water changes to replenish elements taken up by the tank inhabitants is no longer required because the Elementz solutions are already adding what is being taken up. Also water changes alone are usually not enough to control NO3 in the aquarium.

Good Display Tank lighting

It is also worth noting that to have a successful TRITON display suitable lighting must be used. There are many different lighting options available to you at varying costs. T5, Metal Halide, LED. Whatever lighting you choose, they must be capable of delivering "full spectrum" so that your corals and macro algae can thrive. If your lights are not full spectrum then you may find that the necessary macro algae cannot grow and you may run into issues further down the line.

Basic Equipment Checklist

- Sump (TRITON layout preferred)
- Return Pump capable of producing 10x system turnover
- Strong Protein Skimmer
- Full spectrum display tank lighting
- 6500k Algae light
- 3 pump minimum Dosing pump
- Dosing containers
- Media reactor
- 10 litre storage containers

A practical guide to starting the TRITON method

If you are starting a new tank with the view of running the TRITON method then it is important to start with good water, NSW ideally. The tank should be cycled as normal and the algae bed/reactors set up. Once the cycle is complete then you can start dosing the 3 Elementz, the starting dose should be 10ml per 100L of the display tank volume. You should then begin monitoring the Alk (KH), the target level is 8dKH. As previously mentioned, should the KH drop then increase the dose and vice versa. Testing at the beginning should be done daily but as things become more stable then testing can be carried out less regularly. Once a stable dose has been found then it is a good time to send a sample of tank water off for ICP testing to check progress.

If you are converting an existing system over to the TRITON method then you can either get an ICP test done before you start, to see what your water is like, or start dosing the Elementz straight away if you are confident of your parameters. Normally converting from a different method will result in the existing parameters being at an elevated level. If that is the case then the KH should be lowered slowly over a number of days to avoid crashing the system. An ICP test is still recommended to ensure everything is running as it should be.

It is worth noting that as your tank inhabitants population increases and grow then your usage of the Elementz will increase also.

With either setup the following routine maintenance should be carried out.
Clean dosing containers and refill Elementz solutions when required
Check dosing hoses for blockages
Replace AL99/Other every month or when required
Replace Carbon every month or when required
Clean Skimmer regularly
Prune Algae when required to prevent excess die back
Syphon detritus out of sump every 3 – 6 months
ICP/HPLC testing every 2 – 3 months

Conclusion

Hopefully now you can see how beneficial running the TRITON method can be for your reef tank.

A stable ecosystem for your tank inhabitants
An increased knowledge of your systems parameters
A reduced maintenance program by removing the need for routine water changes

So there we have it, a VERY basic guide to the TRITON method. A much more in depth explanation is available on the TRITON website should you wish some further reading.

Also check out the TRITON Method UK, Support and Advice Group on [facebook](#)