

STEP 4 - Daily dosing & fine tuning

From Step 3 you can see the impact of your stock solutions. For example, if your initial calcium level was 380ppm and now it is 400ppm then you now know that dosing 0.25ml per litre of your stock calcium solution should raise levels by around 20ppm.

Meanwhile from Step 2 you know the average daily rate of consumption for your aquarium.

You can now combine these two facts to calculate an appropriate daily dosing rate for your stock solutions...

Example: A 200 litre aquarium has a daily consumption of calcium of 10ppm (Step 2). Initial dosing (Step 3) showed that adding 50ml (0.25ml per litre) of the stock calcium solution raises levels by 20ppm. Therefore, adding half this amount (25ml) each day should balance the normal rate of consumption leaving aquarium levels stable.

Just repeat this process to calculate appropriate daily dosing rates for your magnesium and carbonate solutions.

For the next two days dose your three stock solutions at the calculated rate and then retest to see what effect this has had. If values have drifted a little higher or lower than your previous test then adjust your dosing rates up or down proportionately.

Retest levels after a further couple of days and adjust dosing rates once again if necessary. Within 7-10 days you should have found appropriate dosing rates for your system that maintain stable values. You can then reduce the frequency of testing to once a week for alkalinity and calcium, and fortnightly for magnesium.

Tip: While you can manually dose the solutions each day there are programmable dosing pumps (e.g. Grotech TEC III doser) that can automate this.

PLEASE NOTE!

With this version of the Balling Method it is essential to carry out regular weekly water changes equivalent to at least 10% of the aquarium's volume using a good quality reef salt. Weekly additions of TheReef® Trace elements can also be beneficial. We recommend you aim to maintain your marine aquarium within the following ranges:

Alkalinity ~ 7.8-9.0 dKH
Calcium ~ 410-450 ppm
Magnesium ~ 1250-1350 ppm
Salinity ~ 35 ppt

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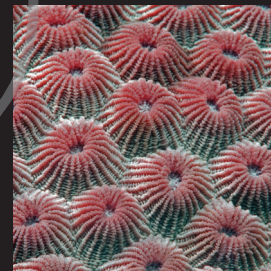
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The Balling Method

for maintaining alkalinity, calcium and magnesium levels in marine aquaria



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The Balling Method

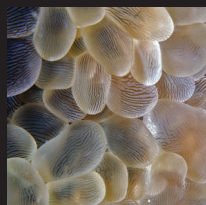
Seawater is a complex chemical soup containing many major, minor and trace elements. Three of the most essential to coral growth and health are calcium, carbonates and magnesium - all of whose levels will naturally decline in a reef aquarium if not supplemented by the aquarist somehow.

In the USA, Randy Holmes-Farley popularised a '3 part' method for meeting these needs by producing home-made liquid calcium, carbonate and magnesium additives which are then dosed into the aquarium to correct imbalances. In Europe a similar approach was developed by Hans-Wermer Balling, which became known as the 'Balling Method'.



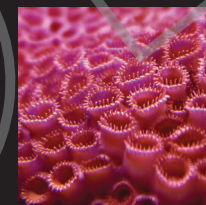
- Calcium solution - dissolve 2kg of Calcium Chloride in 3 litres of freshwater, mixing well. Then top up and fill the container with more freshwater.
- Carbonates solution - dissolve 0.4kg of Sodium Bicarbonate in 4 litres of freshwater, mixing well (though some residue may still remain). Then top up and fill the container with more freshwater.

You can make larger or smaller quantities of the stock solutions if you wish - just make proportionate adjustments to the quantities given above. Once mixed these solutions can be stored almost indefinitely at normal room temperatures.



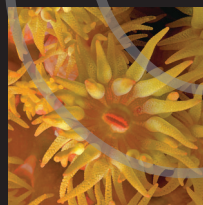
To make up the three stock solutions you will need the following equipment and materials:

- TheReef® pure salts - Sodium Bicarbonate, Calcium Chloride, Magnesium Sulphate and/or Magnesium Chloride
- Accurate test kits for calcium, alkalinity, and magnesium
- Three sealable 5 litre plastic containers
- Pure freshwater (i.e. filtered through reverse-osmosis)
- Kitchen scales and plastic spoons for mixing



The core differences between the two approaches was in how Balling's method tried to prevent ionic imbalances and added additional trace elements to the salt mixes. Over the years though hobbyists have developed many variations on that original method - some more involved, some simpler!

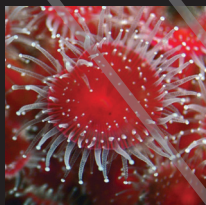
The method described here is a stripped back version of Balling's approach. It aims to maintain stability of water parameters through daily dosing of the three additives in quantities that precisely match the rate at which they are being used. The dosing of additional trace elements is optional, but weekly water changes of at least 10% are essential.



STEP 2 - Measuring consumption

Measure the current alkalinity, calcium and magnesium levels in your aquarium using accurate test kits and note down the results. During the next 24 hours do not carry out any water changes or add any supplements to your system.

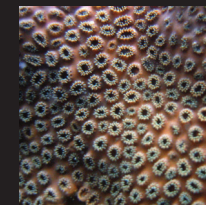
24 hours after the first tests repeat them and again note down the results. If you deduct your latest readings from the original results this will tell you how much alkalinity, calcium and magnesium your aquarium uses up each day.



STEP 1 - Stock solutions

There are two possible formulas for a magnesium solution. The simplest uses only Magnesium Chloride while the more complex adds Magnesium Sulphate in order to create a more ionically balanced solution (i.e. where the balance between chloride and sulphate ions replicates that found in seawater).

- Simple Magnesium solution - dissolve 2kg Magnesium Chloride in 3 litres of freshwater, mixing well. Then top up the container with more freshwater.
or
- Balanced Magnesium solution - dissolve 1.75kg Magnesium Chloride in 3 litres of freshwater, mixing well. Then add 0.25kg of Magnesium Sulphate and mix again before topping up the container with freshwater.



STEP 3 - Initial test dose

Now add an initial dose of your three solutions at the rate of 0.25ml per litre of aquarium volume - so for a 200 litre aquarium add 50ml (200x0.25ml) of each solution. Add the solutions one at a time to an area with high flow, leaving 10 minutes between each addition. An hour later retest levels and note down the results.

There are 4 steps with this method:

1. preparing the three stock solutions
2. measuring consumption rates in your aquarium
3. making an initial test dose; and then
4. daily dosing & fine tuning