Additional application for the AquaCare KWR



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• To offer enough soluble calcium and hydrogen carbonate (alkalinity) there are

- CO₂-driven calcium reactor (*Turbo* Chalk Reactor)
- fluid products like KH-plus and calcium-plus
- "Balling" method

three methods:

With the "Balling" method both components calcium and alkalinity are added as their salts sodium hydrogen carbonate and calcium chloride. This method is not



Bizarre coral world in the cold Atlantic ocean. Picture: Mountains in the Sea 2004. NOAA Office of Ocean Exploration; Dr. Les Watling, Chief Scientist, University of Maine.

very easy because many people have problems to balance out the exact mass and there are salts with different water content. The water content is important for the exact weight. We do not recommend this methods for beginners but only for skilled persons.

Sodium hydrogen carbonate in the KWR

But how to automate the "Balling" method?

As a matter of principle both substance may be dissolved separately in water and pumped with dosing pumps to the aquarium. Calcium chloride will dissolve in large quantities but not sodium hydrogen carbonate. To prevent very large storing tanks for the sodium hydrogen carbonate solution you can use the AquaCare "Kalkwasser" Reactor KWR. You can put large quantities of this salt into the reactor and the pumped water will take in the dissolved ions.

AquaCare experiments show that following salt quantities are suitable for the KWR without problems. After 3 months testing time there were no wearout at axis and ceramic sleeve of the KWR circulation pump.

Model	KWR 75	KWR 110	KWR 250
Minimum possible NaHCO ₃ mass	450 g / 16 oz	900 g / 32 oz	6000 g / 212 oz
Corresponds to solution at 20°C / 68°F	4.61/1.2 US gal	9.31/2.5 US gal	621/16 US gal

You can test larger quantities, of course. The KWR is driven as usual with calcium hydroxide (see manual). If the turbid sodium hydrogen carbonate dispersion in the bottom part of the reactor is dissolved you have to refill the system. If solid salts are forming in the bottom part they will dissolve again with the time by the fresh incoming water. The outlet water of the KWR will have sodium hydrogen carbonate concentration of about 97 g/l (13 oz/US gal) at 20° C / 68°F. To get the same molar mass (same numbers of sodium hydrogen carbonate ions and calcium ions) you need 67 g/l (9 oz / US gal) sodium chloride. If you want to add less sodium chloride solution you can dissolve 670 g/l (90 oz/ US gal) and take only 1/10 of this solution.