

# Autotrophic nitrate filter with or without chalk stage?



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The sulphur granules of the ADN filter serves as a growths substrate and as „food“ for specialized bacteria.  
Photo: AquaCare

## Function of the autotrophic filters ADN

The principle of the ADN is based on the autotrophic de-nitrification. With the help of specialized bacteria sulphur is oxidized and nitrate serves as oxygen source. As by-products gaseous nitrogen – that outgases in the end and has any consequences – sulphate and acid occurs. Unfortunately in some literature the authors speak of sulphuric acid and the aquarist fears that concentrated sulphuric acid is killing the life in the tank.



Professional autotrophic de-nitrifying filter.  
Photo: AquaCare.

In ADNs only very diluted acid is produced. If the water parameters are stable (carbonate hardness, alkalinity) and a regular water change is made any problems will occur.

## Acid binding with a chalk column

To prevent the aquarium system from the acid production some technique manufactures are mixing (calcium carbonate) chalk granules into the sulphur filling.

As a matter of principle this basic approach works.

But during the operation of these systems some negative factors are shown:

- In the filter bacteria are proliferating on the surface of the chalk granules, too. Free acid particles are not able to reach the surface of the chalk.
- Under certain circumstances the bacteria produce gypsum (calcium sulphate) that lays down on the surface of the chalk granules. The granules are sealed and they cannot neutralize uprising acid.
- As a consequence the chalk granules must be changed regularly to maintain the acid neutralization.
- If the sulphur is mixed with chalk granules a replacement of the chalk part is not possible. The sulphur must be changed with the chalk together. Maybe problems will occur because the adapted micro-organisms get lost and must settle down again.
- If the sulphur part is separated from the chalk part, e.g. with a filter mat, it is important that the chalk layer is over the sulphur. Otherwise it is very complicated to change the chalk part. In some filters it is a lot of work to change the chalk granules.
- During the neutralization process not only carbonate hardness (alkalinity) is produced; calcium ions are formed, too. In aquaria with a too high calcium level (seldom it occurs, but we have seen some of these cases) the ad-

ditional calcium production is unwanted and can rise problems. For stopping the calcium production you must remove the chalk granules.

## The AquaCare way

AquaCare is following that way, that every single chemical or biological process should react in a separate column or reactor. This way makes sure that every single process – as far as possible – may be controlled distinctly.

Hobby size autotrophic de-nitrifying filter.  
Photo: AquaCare.



If a chalk reactor is connected to an aquarium an autotrophic nitrate filter (ADN) should be operated without a chalk column. The chalk reactor produces enough carbonate hardness (alkalinity).

Both filters will work in their special optimum and will not affect each other.

If the carbonate hardness is produced by neither a chalk reactor nor another system (fluids or powders) you can connect a chalk column behind the ADN if the pH of the aquarium water drops. The function of this column must be controlled regularly, e.g. by measuring the pH value in the aquarium. If the efficiency of the chalk column decreases you must change the chalk material immediately.