

## **Optimization of biological wastewater treatment plants by using patented technology Made in Germany**

Where performance increases become necessary / for optimization of overloaded plants

The overload of biological water and wastewater treatment plants and/or stricter discharge requirements (nitrification and denitrification, as the circumstances may require) issue new challenges to plant operators.

Many problems of this sort can be solved by enhancing the active biomass. But how, if reaction tanks are too small and the available volume is not sufficient? Especially for nitrification, higher demands on the sludge age apply.

By means of MBBR (Moving Bed Biofilm Reactor) or IFAS technology (Integrated Fixed Film Activated Sludge), respectively, existing plants can be modified for the benefit of an improved performance. In doing so, the biomass which is otherwise lacking in activated sludge plants will be established on special carrier materials. The carrier media is being retained in the tanks by means of retention screens and is intermixed by process air or mixers. Therefore, the filling grade of carrier media can typically be up to 50 % of the tank volume. For further explanations on this, please watch our video clip „Mutag MBBR Technology Movie 1“ on YouTube: <https://youtu.be/dLZYhwWBS4k> .

### **The MBBR process provides a lot of advantages to the operator**

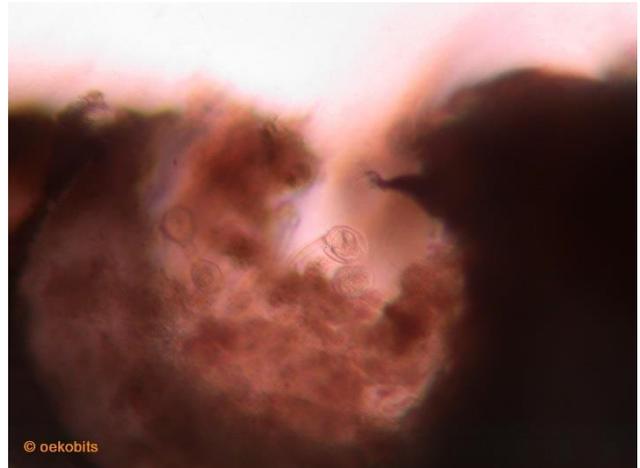
A special advantage for a targeted control of the biocenosis can be taken by applying a patented method of the German company Mutag.

In MBBR reaction tanks, the environmental conditions are adjusted by applying different carrier materials in a way that, according to the task to be performed, either a minimum or maximum of microbial growth is being attained, respectively. By applying at least two different carrier elements (Mutag BioChip 30™ + hollow-body carrier [designation of our partner]) which differ in their shape and size and hence, also show different mechanical characteristics in the water, respectively, it succeeds to define environmental conditions for bacteria / fungi or grazing organisms (protozoa and

metozoa) in a way that the desired group of organisms is provided with optimal conditions of growth and hence, can fulfill the desired metabolism task.



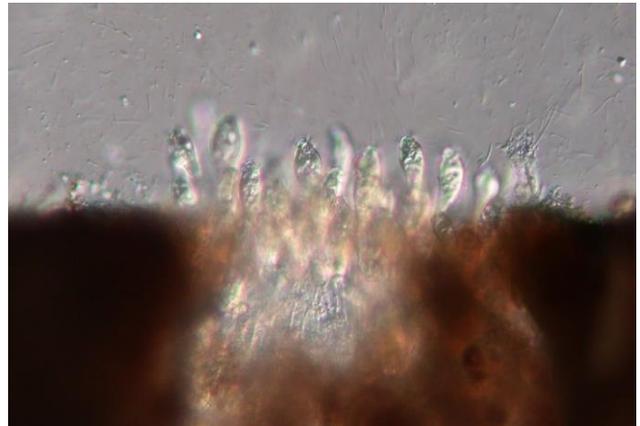
Mutag BioChip 30™ with hollow-body carriers (K1)



Organisms in a pore



Mutag BioChip 30™ with hollow-body carriers (K3)



Bacteria filter feeder



Mutag BioChip 30™ with hollow-body carriers (K1 + K5)



Bacteria filter feeder

## **The advantages of the patented method**

Micro flocks from existing biological plants are normally poorly separated in secondary sedimentation tanks and hence, can have a negative impact on the effluent concentrations of the parameters to be eliminated. Grazing organisms (protozoa and metozoa) metabolize those micro flocks and thereby reduce the arising excess sludge. This implies less excess sludge and optimized effluent concentrations.

Due to the porous Mutag BioChip 30™ carriers, considerably more active biomass can be maintained in the MBBR reaction tank, which contributes to an extreme performance increase. Even at lower reaction tanks (smaller tanks / reactors), a higher performance can be attained. This means a high removal efficiency at smallest space with high process stability (high-performance).

Due to the immobilization of slowly-growing organisms (nitrifying bacteria) on the porous Mutag BioChip 30™ carriers, a high sludge age is ensured, which in turn leads to nitrification in the system and hence, lays the foundation for nitrogen elimination by means of denitrification.

Existing MBBR reaction tanks which are operated with hollow-body carriers can be increased in their performance by adding Mutag BioChip 30™ carriers up to a filling grade of 50 %. A “tuning” without restructuring or new constructions.

1 m<sup>3</sup> of Mutag BioChip 30™ carriers can compensate the biomass of 6 – 10 m<sup>3</sup> hollow-body carriers (factor 6 – 10) and the reaction volume (tank) can be correspondingly smaller. For existing tanks, this means by implication that a certain bulk volume of the contained hollow-body carriers could be removed and replaced by a fractional amount of Mutag BioChip 30™ in order to attain the same removal efficiency. Alternatively, the hollow-body carriers in the existing plant can also be kept in place and hence, be supplemented with Mutag BioChip 30™ carriers for an easy and efficient performance increase.

### **Authors**

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