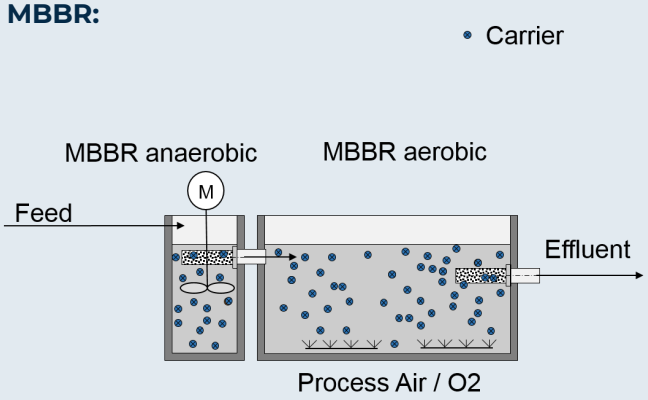
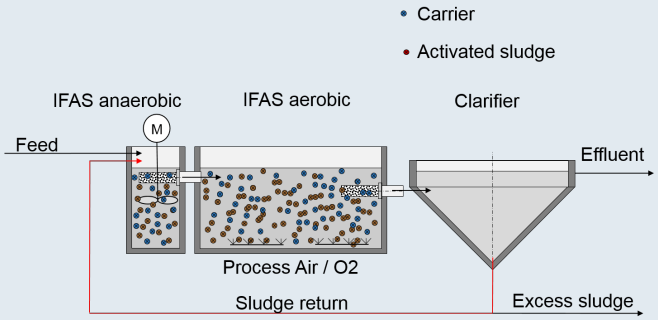
OPTIMAL USE OF MBBR AND IFAS IN WATER TREATMENT

MBBR stands for **M**oving **B**ed **B**iofilm **R**eactor, and IFAS stands for **I**ntegrated **F**ixed Film **A**ctivated **S**ludge System. Initially, it might seem straightforward: a reaction tank is filled with plastic carriers that are mixed with water or a water/sludge mixture. The key distinction between IFAS and MBBR is that the IFAS system also incorporates achieved sludge from sludge recirculation. This means that a combination of activated sludge and carrier-fixed biofilms is utilized within the same reaction tank volume.

MBBR:



IFAS:



CONSIDER WATER TEMPERATURE CAREFULLY IN MBBR/IFAS DESIGN

When designing and comparing proposals for MBBR/IFAS systems, the water temperature is a crucial factor. Incorrect temperature assumptions can lead to significant consequences.

1. High Design Temperature:
If you assume a high design temperature the calculations will show a high biological removal rate, resulting in lower requirements for carrier media and smaller reaction tank volumes. This might seem cost-effective initially, however, during normal plant operation at lower temperatures, you will find that the reaction tank volume and amount of carrier media are insufficient to meet discharge requirements. This may necessitate adding more media, but it could be challenging due to media filling rate limitations (typically 50-60%).

2. Low Design Temperature:
Conversely, assuming a low design temperature results in larger tank sizes and more carrier media than necessary. In practice, the water temperature is likely higher than your calculation assumption. While larger tanks and more carrier media do not harm biological processes, they unnecessarily increase investment costs.

Therefore, accurately considering water temperature in your MBBR/IFAS design is essential to avoid costly issues during plant operation. To ensure the right decision for your MBBR/IFAS plants, it is crucial to establish both min. and max. design temperatures and confirm they have been factored in.

CRITICAL REWIEW FOR SUCCESFUL MBBR/IFAS PROJECTS

Careful review and comparison of design proposals are essential to avoid important data is missing.

If oxygen requirements need specification for the aeration system, remember to use the higher of the two design temperature values. This is because oxygen dissolves less readily in warm water compared to lower temperatures. This is opposite to how removal rates are calculated.

Here is a straightforward rule to follow:

- For calculating the necessary tank and carrier media volume, use the lower temperature.
- For determining the oxygen supply, use the higher temperature.

SIGNIFICANCE OF YIELD IN MBBR/IFAS SIZING

Yield is a critical factor in sizing MBBR/IFAS systems, influencing tank size, carrier media volume, and oxygen supply. It is a value obtained from pilot trials and reference plants, specific to the wastewater source. Choosing the wrong yield can lead to inaccurate system sizing.

SIGNIFICANCE OF REMOVAL RATES IN MBBR/IFAS DESIGN

In MBBR/IFAS wastewater treatment, carriers play a vital role in removing pollutants and optimizing plant performance. Removal rates are essential for designing MBBR/IFAS systems as they measure removal efficiency. Carrier media suppliers must know their media removal efficiency to avoid passing on risk to customers.

FACTORS AFFECTING REMOVAL EFFICIENCY

Removal rates are derived from years of operational experience, including data from large-scale plants, pilot trials, and lab studies. Various factors, such as wastewater origin, characteristics, water temperature, nutrient and oxygen supply, impact removal performance. Generalized removal rates are unreliable and copying rates from other carrier type is not responsible.

Mutag BioChip™.

EVOLUTION OF CARRIER TECHNOLOGY

When certain types of hollow-body carriers have been used in MBBR/IFAS plants for decades, their removal rates are well-documented.

In recent years, research & development efforts have led to innovations like permeable chip-type carriers made from PE-material. Market leaders like MUTAG have invested in product development and practical applications across various wastewater types to provide reliable removal efficiency data for their unique products.

THE IMPORTANCE OF ACTIVE BIOMASS CONCENTRATION

When using hollow-body carriers, microorganisms attach to their surfaces until they detach due to shear-forces. This allows for comparing the theoretically determined surface area, a common practice among different product shapes and manufacturers. However, when it comes to carriers with a pore system, surface area comparisons have limited applicability or may not be meaningful at all.

The reason for this is that the removal efficiency relies on active biomass concentration, making it necessary to conduct long-term tests under the exact process conditions for the specific wastewater.

The optimization of the Mutag BioChip™, with its pore system containing a substantial amount of active biomass, was prompted by the need to enhance performance. This optimization was validated through extensive studies conducted by MUTAG and various institutes/universities.

IN SUMMARY:

When comparing carriers, it is not the surface area of carriers that matters most for removal efficiency, but rather the amount of biomass they can immobilize per unit of volume. Carriers vary significantly in terms of removal capacity, and relying solely on surface area comparisons can lead to problems in plant design.

To ensure accurate plant sizing and minimize risks, it is crucial to validate the removal performance of carriers in the specific wastewater they will treat. Suppliers should possess real performance data for the chosen carrier type.

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