



AnoxKaldnes™

Moving Bed Biofilm Reactor (MBBR)

Integrated Fixed-Film Activated Sludge (IFAS)

and ANITA™ Mox Deammonification

WATER TECHNOLOGIES

AnoxKaldnes™ MBBR and Hybas™ Processes

AnoxKaldnes™ MBBR

(Moving Bed Biofilm Reactor) is a biological wastewater treatment process that utilizes specialized polyethylene carriers (media) to create a large protected surface on which biofilm can attach. The media is mixed in the reactor, and the large surface area provides more treatment capacity in a smaller volume compared to activated sludge.

AnoxKaldnes Hybas™

(Hybrid Biofilm Activated Sludge) technology is an application of the IFAS process in which moving media is mixed into an activated sludge environment. The result is both fixed-film and suspended growth biomass working together and lending the strengths of each to the hybrid process. The Hybas process is excellent for retrofitting existing activated sludge plants to improve ammonia and nitrogen removal.

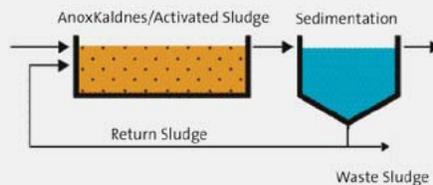
AnoxKaldnes Hybas™ for SBR

AnoxKaldnes Hybas™ systems can be retrofitted into a sequencing batch reactor (SBR) system. The AnoxKaldnes Hybas can increase the capacity of a SBR wastewater treatment process in the same footprint as a conventional SBR without the need for new tankage. The AnoxKaldnes Hybas for SBR uses engineered moving bed media to grow and foster nitrifying bacteria, even at low SRT's and low reactor temperatures. The process allows for greater BOD, NH₃-N, and TN removal.

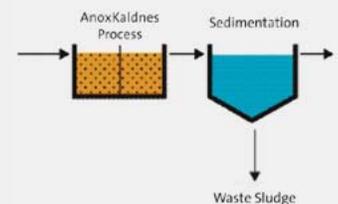
Advantages

- Simple and reliable operation
- Excellent for ammonia and total nitrogen limits (NH₃-N < 1 mg/L, NO₃-N < 1 mg/L)
- Smaller footprint than activated sludge
- Increase plant capacity for nitrification and/or denitrification
- Effective in cold water
- Accommodates a wide range of flow and load fluctuations
- Non-clogging media with a long lifespan
- Flexible design for almost any tank configuration

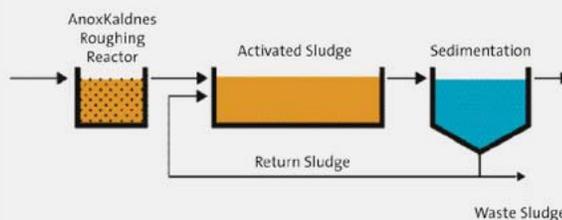
Hybas™ Technology



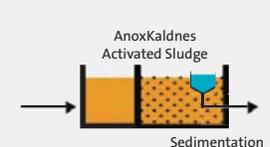
MBBR



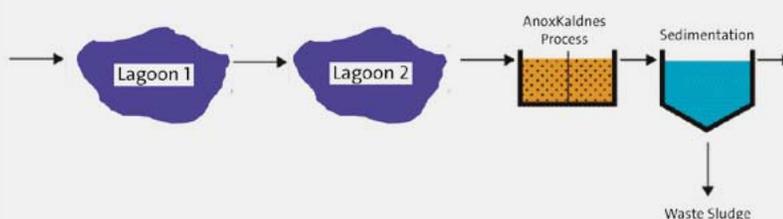
Biofilm Activated Sludge



Hybas™ for SBR



LagoonGuard® MBBR



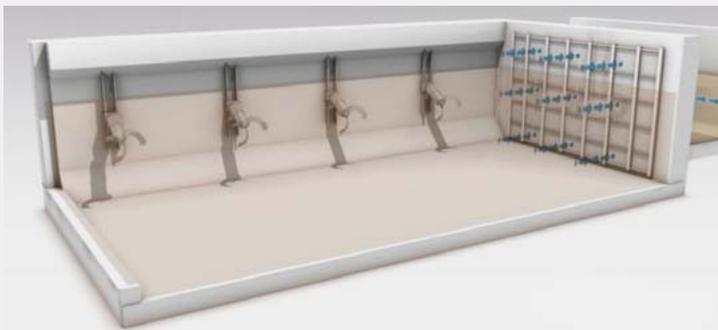
Air Grids and Media Retention Screens



Aerobic Applications

- AnoxKaldnes stainless steel air diffuser system is robust, non-clogging and maintenance free
- Diffusers provide oxygen for process needs and media mixing for optimal biological performance
- Cylindrical screens at reactor's effluent wall retain media while allowing treated water and suspended solids to pass through

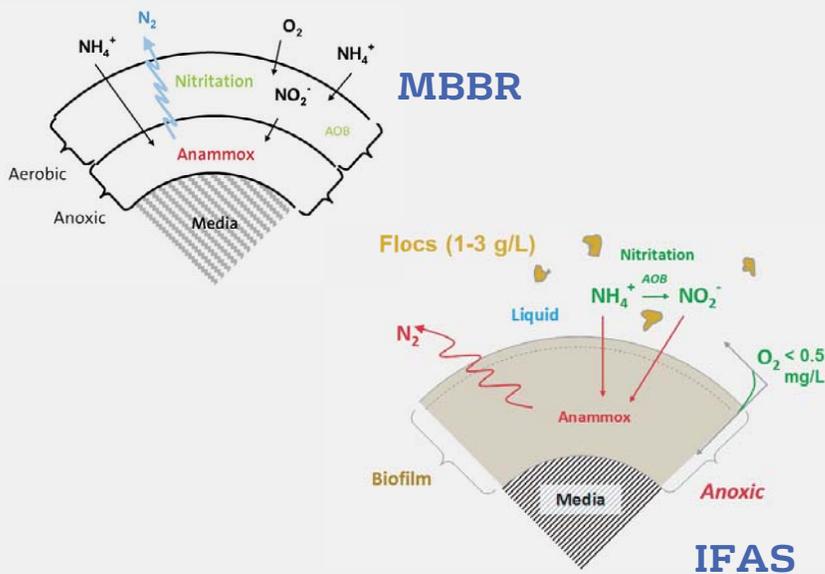
Mixers and Flat Screens



Anoxic Applications

- AnoxKaldnes stainless steel air diffuser system is robust, non-clogging and maintenance free
- Diffusers provide oxygen for process needs and media mixing for optimal biological performance
- Flat screens at reactor's effluent wall retain media while allowing treated water and suspended solids to pass through

ANITA™ Mox Deammonification



System Supplier Scope of Supply

- Complete process design with effluent guarantees
- Process equipment including media, screens, air grids, blowers, pumps, mixers and valves
- Field instruments and process control
- Customized SCADA for the highest level of operations monitoring and control

The ANITA Mox process combines aerobic nitritation and anammox reactions simultaneously in a single reactor. With MBBR, the reactions take place in different layers of biofilm on the AnoxKaldnes media. With IFAS ANITA Mox, most of the nitritation reaction occurs in the suspended biomass, while the anammox reaction takes place on the carrier media. The MBBR and IFAS ANITA Mox platforms both provide a robust, stable process with simple operation, energy and chemical savings, and efficient ammonia removal.

AnoxKaldnes Technology Can Benefit A Wide Range of Plant Sizes



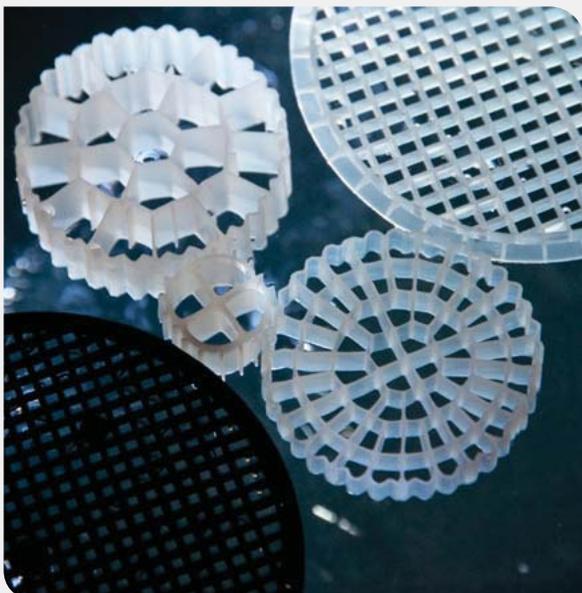
Cheyenne, WY *AnoxKaldnes MBBR*

- In 2005, MBBR replaced trickling filters and was chosen because it is a biofilm process that is compatible with the existing clarifiers.
- Consists of two trains of two pre-anoxic and four aerobic reactors in series to treat 6.5 MGD and achieve BOD <10 mg/L and ammonia <2 mg/L, NO_x-N <9 mg/L.



Providence, RI *AnoxKaldnes Hybas Technology*

- Ten parallel process trains with a treatment capacity of 77 MGD
- Existing aeration basins converted to a 4 stage process with one IFAS zone per train
- Pre-anoxic stage for denitrification using the influent BOD as a carbon source
- Aerobic Nitrification stage for BOD and Nitrification – IFAS Zone. 52% fill using AnoxKaldnes K3 media type. Total media surface area of 36.3 million square feet
- Post-anoxic stage for additional denitrification using an external carbon source
- Clarification stage for solids separation and collection



Winning Combinations

- *High rate clarification with ACTIFLO®*
- *Primary clarification with MULTIFLO*
- *Filtration with Hydrotech Discfilter*

Resourcing the world

Veolia Water Technologies

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