

ADI SYSTEMS INC. – ANAEROBIC MEMBRANE BIOREACTOR (ADI-AnMBR)



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The development and utilization of efficient, renewable, sustainable sources of energy, the reduction in greenhouse gases from conventional energy sources, and the proper management of industrial wastewaters are all key challenges for the 21st century. To meet these challenges, many are now looking back to an old technology, anaerobic digestion, as a way to produce renewable forms of energy from wastewaters and waste biomass. In turn, this forward thinking has led to the development of a new twist on that old technology, the anaerobic membrane bioreactor, or AnMBR.

The ADI-AnMBR

The ADI-AnMBR process is based on award-winning technology developed by Kubota Corporation of Japan. It is a form of high-rate anaerobic contact process that uses a submerged membrane barrier to perform the gas-liquid-solids separation and reactor biomass retention functions. This near-absolute barrier to solids ensures efficient system operation, even under high organic loading and intense mixing scenarios. Since gravity settling is not required, higher organic loadings and mixing intensities can be employed than with other anaerobic technologies, thereby increasing organic removals, improving biogas production, reducing system footprint, and allowing for treatment of wastewaters with very high suspended solids (TSS) and/or fats, oils and grease (FOG).

Biogas generated in the anaerobic digestion process is utilized to continually clean the

submerged membranes during operation via a gas scour system. The biogas is collected from the anaerobic reactor(s) and passed through integral diffusers on the bottom of each Kubota membrane cassette. The agitation from the rising gas and liquid continually cleans the membrane surfaces as treated effluent is filtered through them. This gas scour system has proven to be highly effective and results in typical maintenance cleaning intervals of one to three months.

Unparalleled Anaerobic Effluent Quality

Regardless of the application, the ADI-AnMBR consistently produces the highest-possible-quality anaerobic effluent. This is a direct result of the submerged membrane barrier and the near-absolute retention of suspended solids within the reactor. This greatly reduces the requirements for downstream treatment of the anaerobic effluent and simplifies downstream treatment processes. The AnMBR is often paired with an aerobic ADI-MBR to provide complete treatment and meet the strictest discharge requirements.

Thermophilic and Mesophilic Operation

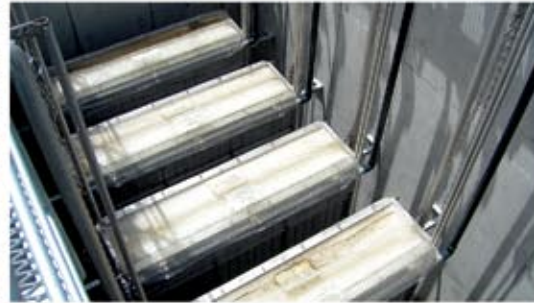
The ADI-AnMBR can operate at thermophilic temperatures (better removals, more biogas, reduced sludge production). The submerged membrane barrier overcomes the common operating problems at thermophilic temperatures (biomass loss, unstable operation). The technology can also be operated at more common mesophilic temperatures, allowing for efficient, cost-effective treatment in a wide range of applications and a variety of wastes.



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Proven Performance

The submerged membrane technology utilized in the AnMBR is the same industry-leading technology utilized by Kubota and its partners in their aerobic MBR systems, and has a huge body of operating experience, proven long life and high performance. The membranes have been employed in full-scale AnMBR systems since 2000 and in full-scale trials since the mid-1990s. The technology is now used in a wide range of industries, consultants and end-users. As leaders in the anaerobic treatment of industrial wastewaters, ADI strives to provide only proven, high-performance technologies to clients.

Renewable Energy

One of the by-products of the ADI-AnMBR treatment process is biogas, or bio-methane. Biogas, or bio-methane, is a renewable energy source that can be collected and burned as an alternative to natural gas. In larger systems, co-generation of electricity is also possible. The AnMBR can produce biogas from a wide range of wastewaters and biomass sources.

A variety of technologies are available for scrubbing of the biogas for use in boilers, electrical generators and turbines. It can also be cleaned to pipeline-quality and compressed for injection into a nearby natural gas pipeline. The generation of energy from waste provides a number of advantages, including a tangible return on investment due to the displacement of conventional energy sources.

Advantages

Some of the advantages of ADI-AnMBR technology over other anaerobic systems include:

- Higher loadings and higher mixing/contact intensities possible due to complete retention of biomass
- Smaller footprint
- Superior quality, solids-free anaerobic effluent
- More stable process due to elimination of biomass loss
- Can operate at thermophilic temperatures, yet avoids common operating problems at thermophilic temperatures
- Able to handle very high concentrations of TSS and FOG
- Granular sludge is not required
- Can digest waste activated sludge from downstream aerobic process

Applications

The ADI-AnMBR can be utilized to treat essentially any wastewater amenable to anaerobic treatment, but is most applicable to very strong, concentrated wastes, solid and semi-solid wastes and slurries, and wastewaters with poor settling characteristics, including:

- Distilleries
- Wineries (wastewater and pomace)
- Fuel and food-grade ethanol production stillages, syrup and spent grains
- Food processing wastewaters
- Chemicals production
- Biomass digestion for energy production



ADI SYSTEMS INC.

ADI Systems is a technology and design-build company that offers a wide range of wastewater treatment systems to customers around the world. We offer both bench and pilot testing, plus custom-designed solutions to provide the best treatment package. In addition to generic technologies, ADI Systems offers proprietary and patented technologies for both anaerobic and aerobic biological waste treatment applications. ADI Systems Inc. provides large treatment systems as well as modular systems for small plant applications.