



Cost Estimation of Pilot-scale Membrane Bioreactor

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ABOUT THE STUDY

Membrane bioreactor is generally a term used to define wastewater treatment techniques where a perm-selective membrane for example microfiltration or ultrafiltration, it is integrated with a biological process specifically a suspended growth bioreactor. Membrane Bio Reactors (MBRs) differ from 'polishing' techniques where the membrane is employed as a discrete tertiary therapy step with no return of the active biomass to the biological process. Membrane Bio Reactors (MBRs) consist of a biological reactor with suspended biomass and solids removal through ultrafiltration and microfiltration membranes. These can be used for industrial wastewaters. The primary disadvantage of Membrane Bio Reactors (MBRs) systems is the generally higher capital and operating costs than conventional systems for the same through put.

It is a combination of biological technique with membrane filtration that is known as Membrane Bioreactor. In this case, the degradation of biomass is occurred in the bioreactor tank, while separation of treated wastewater form microorganisms is completed in a membrane module. The Membrane Bio Reactor (MBR) technology provides the following advantage. High-quality effluent, higher volumetric loading rates, shorter Hydraulic Retention Times (HRT), longer Solid Retention Times (SRT), less sludge production, and potential for simultaneous De-nitrification in long Solid Retention Times (SRTs). Membrane Bio Reactors (MBR's) combine conventional biological treatment example activated sludge techniques with membrane filtration to provide an advanced level of organic and suspended solids removal. When designed accordingly, these structures can also provide an advanced level of nutrient removal. Membrane Bio Reactor (MBR) is a combination of membrane technique like microfiltration or ultrafiltration with a biological wastewater treatment technique, the activated sludge method. It is now widely used for industrial wastewater treatment.

The global membrane bioreactor market is expected to develop in the near future because of various driven elements for instance scarcity of water worldwide, which makes wastewater reclamation necessary. This will be further aggravated through climate change. The develop environmental concerns over industrial wastewater disposal along with the declining freshwater resources across developing economies also accounts for the demand of Membrane Bio Reactor (MBR) technology. Population growth and industrialization will further complement the business outlook. Contingent on their composition, these changes can be demanding on natural resources and pose unsustainable challenges for environment. Therefore, Membrane Bio Reactor (MBR) technology is regarded as a key element of advanced wastewater treatment and reuse schemes and it is focused to grow towards sustainable water management across the industrial sectors.

Membrane bioreactors can be used to reduce the footprint of an activated sludge sewage treatment system through removing some of the liquid components of the mixed liquor. This leaves a concentrated waste product that is then treated using the activated sludge procedure. A membrane bioreactor system is a combination of activated sludge technique and membrane technology. Using ceramic membranes in membrane bioreactors offers a good solution for the fouling problem encountered in conventional Membrane Bio Reactors (MBRs).

The membrane bioreactor has emerged as an efficient compact technology for industrial wastewater treatment. The major disadvantage impeding wider application of membrane bioreactor is membrane fouling, which significantly reduces membrane performance and lifespan, resulting in a significant increase in maintenance and operating costs. Finding sustainable membrane fouling mitigation techniques in membrane bioreactor has been one of the major concerns over the last decades. This paper provides an overview of membrane fouling and studies conducted to identify mitigating techniques for fouling in membrane Bio Reactor (MBRs).

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