Universidad Carlos III de Madrid

OO/UC3M/31 – BIOMEMBRANES FOR WASTEWATER TREATMENT

Engineering laboratory for wastewater treatment of UC3M (Spain), optimizes the set-up and the design of membrane bioreactors (MBR), advised for higher quality of the treated water or to increase the treatment capacity.
MBR system is a versatile method that achieves a fast depuration of biodegradable water, where nitrogen and phosphorous removal can be integrated in a simple way.
Companies interested in applying or developing this technology or micro and ultra filtration membrane producers who want to extend their market to water treatment by MBR are sought.

Description of technology
Membrane bioreactors (MBR) are amongst the most promising applications of active sludge systems (AS). A MBR system consists in a biological reactor where aerobic biomass is suspended in the wastewater to be treated in the presence of oxygen. If only for this fact, an important difference with respect to traditional AS systems, is that biomass concentration is much higher (up to five times), which results in a very high speed of the degradation of organic matter and also in a very high quality of the water obtained. The important benefit between a MBR and an AS system lies in the method used to separate biomass from treated water, as in MBR systems this is achieved by filtration instead of decantation. Ultrafiltration membranes (separation threshold of a hundred-thousandth of a millimeter) are usually employed in MBR, allowing to retain virus, proteins and colloidal particles, and therefore the water obtained has a high level of disinfection, and it is only necessary to add a small amount of secondary disinfectant (chlorine generally) to ensure the permanence of these sterility conditions. MBR systems present the following advantages over Active Sludge systems: • A higher capacity (volume) for the same facility size. • A lower amount of sludge produced per cubic meter of treated water. • Better quality of the treated water, allowing its direct discharge to cultivated surfaces or to recharge aquifers.

Innovative aspects
MBR systems are versatile methods that achieve a fast depuration of biodegradable water, where nitrogen and phosphorous removal can be integrated in a simple way. MBR are robust systems that, once optimized, can be integrated into the production process in a short period of time without the need to carry out large structural modifications. The stability of the system is very high, with the advantage that the control of the process and its operation are easy to automate.

Competitive advantages
Treating wastewater with MBR allows companies to reuse process water in many instances, thus decreasing supply costs. A company may become more sustainable as higher quality water is obtained, with a much smaller volume of sludge, than in Active Sludge processes. Integration into existing production processes is very easy due to the small space required to implement a MBR system.

Current state of intellectual property: ☒ Secret know how

Keywords
Filtration and membrane processes; Water pollution / treatments; Environmental Technology / Engineering.

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