Membrane Aerated Biofilm Reactor (MABR)

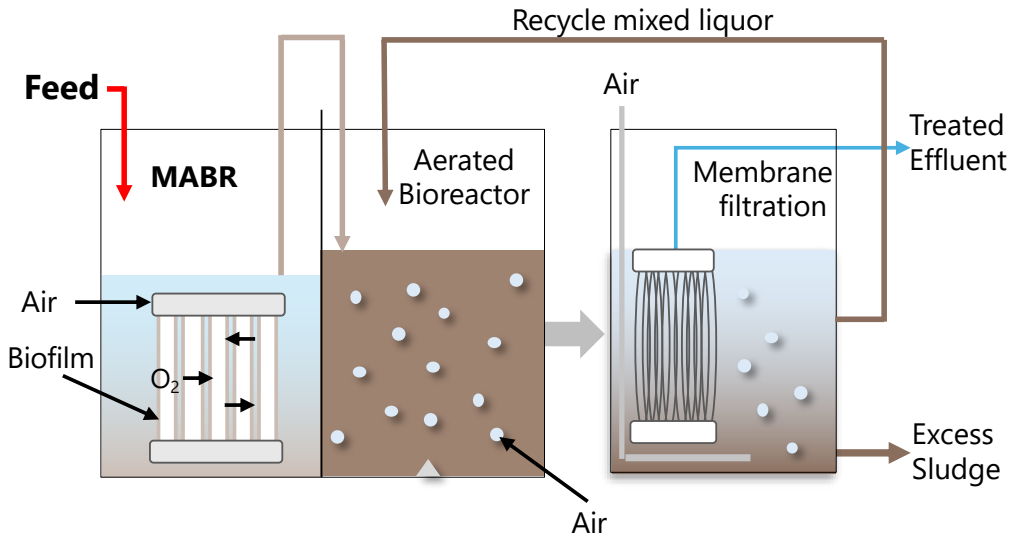
Process Description

MABR is a biological wastewater treatment process that integrates biofilm treatment with membrane-based aeration.

The process uses gas-permeable hollow-fiber membranes as supports for biofilm growth. Oxygen is supplied through the membrane lumen and diffuses outward, while organic matter and ammonia diffuse inward from the bulk wastewater, creating a counter-diffusional environment. This bubbleless aeration approach improves oxygen transfer efficiency and enables simultaneous carbon removal, nitrification, and denitrification within the biofilm.

In hybrid MABR systems, a downstream membrane separation unit is used to retain suspended solids and detached biomass while producing a clarified effluent. Biomass is recycled to the bioreactor to maintain treatment performance. The process offers a compact footprint and retrofit potential for existing facilities. MABR can be applied for wastewater reuse applications and as a pretreatment step for downstream processes such as reverse osmosis.

Process Schematic



Publications

Feasibility and application of membrane aerated biofilm reactors for industrial wastewater treatment (Link)

For further information, please contact us at email: GWSC@conocophillips.com