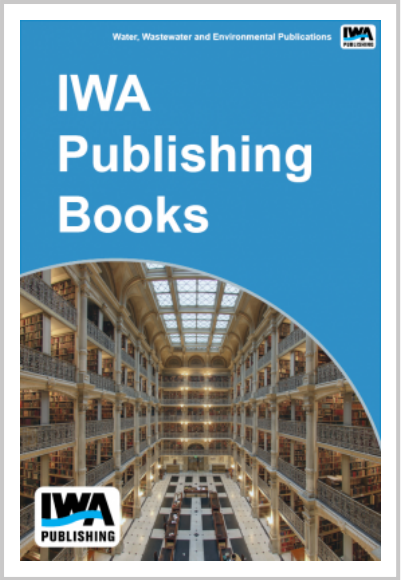
Design Guidelines for Membrane Diffusion and the MABR: A New Paradigm in Gas Transfer for Resource Recovery



The main energy demands at Water Resource Recovery Facilities (WRRFs) is associated with the aeration of aerobic processes which alone accounts for over 50% of the total energy used (EPA, 1989)). Oxygen has historically been transferred to the activated sludge process via diffusers, with relatively low oxygen transfer efficiencies. An improvement on diffusive membrane gas transfer was realized with Membrane Aerated Biofilms (MABRs) for wastewater treatment. MABRs utilize membranes or permeable substrates on which to grow biofilms, and transfer oxygen to the base of the biofilm. This results in the creation of a biofilm with substrates diffusing from opposite sides, which is termed a counter-diffusional biofilm. This counter diffusion allows for unique concentration profiles in the biofilm and the creation and modification of zones (layers) in the biofilm which are complementary. The subject of this book will be the design and operation of counter diffusional biofilm reactors, with particular focus on the Membrane Aerated Biofilm Reactor (MABR). Past research, current best practices for design, guidelines for operation, modeling best practices, and future areas of research need will all be discussed. The design and operating guidelines are summarized in easy to reference, condensed chapters for efficient use will be included in the book.

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