Control of mixing for optimal formation of dynamic membrane in MBRs

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**ABSTRACT**

Dynamic membranes (DMs) formed upon cost-effective mesh filters are considered as convenient alternatives to conventional membranes in membrane bioreactors (MBRs). This novel study investigates how hydrodynamics resulting from aeration rates of 2.5, 5, 10, and 15 L/min and agitation speeds of 100, 200, 300, and 400 rpm affect the sludge particle size, soluble microbial product (SMP), accumulation of sludge upon filter media, fouling propensity, effluent turbidity, and separation properties of DMs. The results conveyed that mixing flow and mixing intensity affect sludge properties considerably as well as DMs formed in the MBR. Despite fouling propensity, sludge mean particle size and dry weight of DMs decreased by increasing aeration rate and agitation speed. Optimum performance in terms of turbidity removal and blue pigment separation was obtained at the aeration rate of 5 L/min and the agitation speed of 300 rpm. In addition, more uniform DMs were formed by the flow pattern created by agitation which improved the performance. The DM formed by the agitation speed of 300 rpm could remove approximately 82% of blue pigments with a mean particle size of 0.9 μm which performs similar to microfiltration.

**Keywords:** Aeration; Agitation; Dynamic membrane; Filtration performance; Mean particle size