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Effects of solids retention time on the performance and microbial community structures in membrane bioreactors treating synthetic oil refinery wastewater

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ABSTRACT

The treatment of oil refinery wastewater has attracted a significant attention for containing hazardous pollutants and causing adverse impacts on the environment. Three submerged membrane bioreactors (MBRs) treating synthetic oil refinery wastewater containing aromatic hydrocarbons including toluene and anthracene were operated at the different solids retention times (SRT) (10, 30 and 60 days) to investigate pollutants removals and membrane fouling characteristics. *Mycobacterium* and *Sphingomonas* capable of degrading aromatic compounds found in MBRs may contribute to high removal efficiencies (>99%) of aromatic hydrocarbons at three SRTs. It is observed that nitrifying bacteria at short SRT of 10 days was in low abundance, and the resulting removal efficiency of $\text{NH}_4^+\text{-N}$ was only 79%, which is much lower than those in MBRs at the SRTs of 30 and 60 days (>97%). Severe membrane fouling and the minimal membrane fouling was observed at the SRT of 10 and 30 days respectively. Additionally, the investigation of loosely bound extracellular polymeric substances (LB-EPS) content including the protein and polysaccharide induced by SRT indicated that high LB-EPS concentration at the SRT of 10 days caused severe membrane fouling. The relative abundances of the biofilm-forming bacteria *Deinococcus* and the bulking and foaming bacteria

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