



## Performance and evaluation of aerobic granular sludge in oily wastewater treatment

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### ABSTRACT

Oily wastewater treatment through membrane separation is remarkably effective, but the high operation cost and poor resource recovery potential of this method necessitate the application of an integrated physical/chemical–biological oily wastewater treatment. In this study, aerobic granular sludge was applied for oily wastewater treatment from the ultrafiltration (UF) effluent of a two-stage UF–reverse osmosis process. The removal efficiencies of the sludge for oil and chemical oxygen demand reached 94.1% and 85.6%, respectively. The protein concentration of extracellular polymeric substances (EPS) increased to 34.6 mg/g MLSS, and the relatively high protein/polysaccharide ratio was found to be closely related to the formation of aerobic granular sludge. In addition, protein in loosely bound-EPS was converted to tightly bound-EPS (TB-EPS), which indicated that the protein in TB-EPS could be the major factor affecting the granulation process. Separate sludge incineration could be achieved due to the lower heating value of granules was as high as 8.5 MJ/kg. Furthermore, the proposed process could enhance the treatment efficiency of the sludge incinerator and increase the amount of heat energy that could be recycled.

*Keywords:* Aerobic granular sludge; Tightly bound-extracellular polymeric substances; Oily wastewater treatment; Sludge treatment; Heating value

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