

## A hybrid flotation–membrane process for wastewater treatment: an overview

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### ABSTRACT

Wastewater produced from many industries such as dyeing, textile industry, minerals processing/phosphate beneficiation, food processing and deinking is either reused after being treated by conventional treatment methods or pumped to drainage systems without treatment. This represents a serious environmental problem and causes challenges to the countries which face water shortages. A hybrid dissolved air flotation (DAF)-membrane process is a promised technology which can be used for treatment of many types of wastewater. Froth flotation is usually used to remove large proportion of suspended or dissolved solids while the membrane cell can reject very small particles. In this paper, a comprehensive review on the treatment of wastewater using DAF process alone as well as a hybrid flotation membrane was discussed. Various ways of hybrid flotation–membrane filtration such as flotation–microfiltration (MF), flotation–ultrafiltration (UF), flotation–nanofiltration (NF), and flotation–reverse osmosis (RO) are also addressed. The review showed that the hybrid flotation membrane system can achieve high separation performance with reasonable price compared with the traditional DAF or membrane-based filtration systems. This extends the use of this emerging technology to treat new types of wastewater or improving the existing technologies which reduce the effect of harmful effluents on the surrounding environment. Moreover, using flotation in combination with MF/UF has reduced membrane fouling and extended their useful working time. This leads to a reduction in operation cost and improves the efficiency of membrane performance. Hybrid flotation–NF/RO is a new technology for wastewater treatment which produces high quality water with greater recovery and lower energy and reagents consumption. Finally, the review also addressed the new application of DAF as pretreatment for the desalination processes.

*Keywords:* Dissolved air flotation; DAF; Membranes; Hybrid system; Wastewater treatment

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