

## Understanding PVDF ultrafiltration membrane fouling behaviour through model solutions and secondary wastewater effluent

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### ABSTRACT

In this work, we investigated the fouling behaviour of polyvinylidene fluoride (PVDF) ultrafiltration (UF) membranes. PVDF UF membranes prepared by the phase separation method were used to filter four sample solutions, namely bovine serum albumin (BSA), sodium alginate (SA), humic acid (HA) and secondary wastewater effluent organic matter (EfOM). Fouling experiments were carried out in a dead-end filtration set-up. Besides, the removal rate of dissolved organic carbon, the distribution of molecular weight and the permeability of feed water were inspected through direct comparison of the surface morphology of an uncontaminated and a contaminated membrane. The different fouling behaviours of BSA, SA, HA and EfOM were noted. It was found that the flux of the BSA-fouled membrane declined sharply at the initial filtration stage, but a more significant flux decline occurred for the SA-fouled membrane at the later filtration stage. For the HA-fouled membrane, a gradual flux decline was observed throughout the whole filtration stage. In three samples, HA generated the smallest flux decline rate and BSA produced the largest rate. Moreover, the fact that it took a very short time to approach about 50% flux reduction indicated that membrane fouling mainly occurred in the initial filtration stage. It was also found that the gel-layer structure on the membrane surface was strongly associated with the fouling behaviour of the membrane.

**Keywords:** Polyvinylidene fluoride; Fouling behaviour; Foulant types

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