

Proposing a new fouling index in a membrane bioreactor (MBR) based on mechanistic fouling model

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ABSTRACT

Membrane fouling is the most serious problem in membrane bioreactor (MBR) process, which is restricting the widespread application of MBRs in wastewater treatment processes. In recent years, several studies on the precise diagnosis and prediction of the membrane fouling have been carried out to obtain an efficient operation of MBRs. The aims of this study are 1) to predict the membrane fouling and to determine the chemical cleaning interval of membrane using traditional mechanistic fouling model; and 2) to propose the new fouling index based on the usually obtained traditional technique. As the traditional fouling technique use an exponential fouling model, however, this method has some shortcomings, such as inadequate comprehension of the fouling mechanism and steady state assumption. Therefore, in this study, the coefficient (κ) of the exponential fouling model is proposed as a new fouling index to overcome the inadequate understanding of the fouling mechanism and steady state assumption in traditional technique. To propose the coefficient (κ) as the new fouling index, least-square (LS) method and recursive least-square (RLS) methods are applied in the exponential fouling model. The coefficient (κ) shows the similar tendency with the permeability which is another kind of fouling index. It is verified that the coefficient has been validated as the new index for diagnosis of the fouling progress as well as the prediction of membrane fouling.

Keywords: Membrane bioreactor; Membrane fouling; Membrane cleaning interval; Fouling mechanistic model; New fouling index; Recursive least square method

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