

## Limitations of resistance-in-series model for fouling analysis in membrane bioreactors: A cautionary note

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### ABSTRACT

The resistance-in-series (RIS) model has been used frequently to analyze membrane fouling phenomenon encountered in membrane bioreactors (MBRs) applied to wastewater treatment. Although it is easy to apply, there is a need to be cautious in the use of the RIS model, particularly when it is used to determine the relative values of the main membrane fouling components of an activated sludge suspension. The complex living suspension is not easily represented by simple addition of resistances; when researchers have checked for additivity of components, it has *not* been found. Most of the published work assumes that additivity and often two of the three individual resistances are measured and the third simply inferred. This is not justified. Better insights into the fouling in MBRs will be dependent upon the adoption of a standardised approach to fractionation and a commitment to measure the resistances of all three components considered.

**Keywords:** Activated sludge; Colloidal solids; Membrane fouling; Resistance; Suspended solids; Wastewater

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