

Modelling hindered batch settling Part I: A model for linking zone settling velocity and stirred sludge volume index

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Abstract

A new type of model for describing the relationship between zone settling velocity (V_s) and stirred sludge volume index (SSVI) is developed. Compared to the earlier studies which link SSVI and V_s (to reduce multiple batch tests when collecting X- V_s data), the proposed model is more advantageous because it also describes regions of low solids concentrations. The model is derived from

the model for batch settling curve and is expressed as $V_s = C \left(\frac{1000X}{(X^2 + \beta)SSVI} - 1 \right)$, where C and β are parameters describing zone settling velocity and X is the activated sludge concentration. The applicability of the relationship was tested by analysing data published earlier in the literature. Based on these data it was found that the model can be used in wide ranges of SSVI and sludge concentration.

A modified Vesilind model is also introduced and written as $V_s = \frac{1000v}{SSVI} e^{-nX}$, where n and v are parameters describing zone settling velocity.