

Original Articles

Evaluating Dissolved Ozone in a Bubble Column Using a Discrete-Bubble Model

不連続曝気モデルを用いた曝気カラム中の溶存オゾンの評価

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ABSTRACT

Ozonation has been widely applied in water treatment plants, so it is essential to figure out mass transfer and reaction kinetics in ozone contact tanks. In this study, a discrete-bubble model was established to calculate the dissolved ozone concentration in a countercurrent flow system. Results from batch experiments showed that an exponential relationship was well fitted between ozone reaction rate coefficient and ozone consumption amount, and the relationship was not affected by the ozone dosage. Therefore, it was applied in a discrete-bubble model, which was validated by experiments in a countercurrent bubble column with error less than 15%.

水処理プラントではオゾン処理が広く適用されており、オゾン接触槽での物質移動や反応速度の解明が不可欠である。本研究では、逆流系における溶存オゾン濃度を計算するために不連続曝気モデルを構築した。バッチ実験の結果、オゾン反応速度係数とオゾン消費量との間には指数関数的な関係がよく適合し、オゾン量の影響を受けないことがわかった。そのため、不連続曝気モデルに適用し、逆流曝気カラムでの実験では15%以下の誤差で検証した。

KEYWORDS: Ozone, Bubble Column, Exponential Relationship, Mass Transfer, Ozone Consumption Amount, Reaction Kinetics

キーワード: オゾン、曝気カラム、指数関数的関係、質量移動、オゾン消費量、反応速度論