Evaluation of hydroxyl radical pathway and kinetic process for bubbling ozonation of methylene blue as reference compound

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\textbf{ABSTRACT}

Ozonation experiments were conducted in a bubble column reactor taking methylene blue (MB) as model compound, where the role of solution pH and organic load as basic parameters of wastewater influencing pathway of hydroxyl radical (HO\textsuperscript{•}) and the kinetics were investigated. The relative significance of HO\textsuperscript{•}-pathway was evaluated compared to molecular ozone in both kinetics and degradation process. Results showed that, as solution pH increased from 5 to 11, the contribution of HO\textsuperscript{•} (labeled as \(\theta\)) got intensified from 0.05 up to 0.80 (apparent HO\textsuperscript{•} abundance proliferated up to \(3.76 \times 10^{-7}\) M), giving rise to an exponential growth of pseudo-first-order rate constant as well as an enhanced mineralization. Reduction of initial organic concentration ([C]\textsubscript{0,MB}) retarded chemical gas-to-liquid absorption of ozone and the global degradation of MB, while interestingly at the same time, the kinetic rate constant on MB decolorization accordingly began to grow up since the HO\textsuperscript{•}-pathway impact substantially got reinforced (\(\theta\) elevated from 0.80 up to 1.944 when [C]\textsubscript{0,MB} decreased from 80 to 20 mg L\textsuperscript{-1} under pH 11).

\textit{Keywords:} Ozonation; Bubble column; Hydroxyl radical; Kinetic process; Degradation

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