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AIR DISPERSION MODELLING AND SIMULATION IN AERATION TANKS

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Abstract

The necessary oxygen concentration for the biological process depends on the organic matter present in wastewater characterized by organic matter reaction rate with oxygen, k . This article highlights the impact of the reaction coefficient on oxygen dispersion in water. The first stage of the research led to the determination of the ratio between the coefficient of reaction and the coefficient of dispersion on the vertical of the tank as $k/\varepsilon_z \in [0.066 - 0.79]$. Starting from this ratio, the specific oxygen flow required for the aeration process was determined to obtain a minimum oxygen concentration of 2 mg/L in the bottom zone of the tank: for $k=3$, specific gas flow $q_g=1.37$ [$\text{m}^3/\text{s}\cdot\text{m}$], for $k=0.2$, $q_g=0.77$ [$\text{m}^3/\text{s}\cdot\text{m}$] and for $k=1.5$, $q_g=1.03$ [$\text{m}^3/\text{s}\cdot\text{m}$]. Value of gas flow rate has an important impact on reduction of the costs of wastewater treatment plants. This value has an important impact on the reduction of costs for wastewater treatment plants.

Key words: aeration tank, dispersion coefficient, reaction rate

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