

Development of The Oxygen Mass Balance Equation for aerobic bioreactors

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Abstract

This paper addresses a problem common to all the standards, which is the application of clean water test result to Process Oxygen Transfer Rates. By modifying the conventional model used by the standards for this application, and if proper OUR (oxygen uptake rate) methods can accurately determine the respiration rate, this paper attempts to show that the clean water tests can be used to determine the oxygen transfer efficiency of an aeration device in the field. The new model is based on previously developed mathematical models, and also based on the novel concept of a resistance to gas transfer due to microbial activity in the field. It is postulated that the relative mass transfer coefficient, α (alpha), the ratio of mass transfer coefficient in wastewater KLa_f to mass transfer coefficient in water KLa , is independent of microbial activities. The field-determined OTE_{pw} is mathematically associative to the transfer process by addition.

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