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METHODOLOGY TO CONSERVE ENERGY IN SURFACE AERATORS

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Abstract

Based on the simulation equations, which were developed earlier (Rao, 1999 and Rao et al., 2007) relating the oxygen transfer coefficient k (= K_La_{20} $(\upsilon/g^2)^{1/3}$) with theoretical power per unit volume of water X (= $N^3D^2/g^{4/3}\upsilon^{1/3}$) and k with actual power consumed by the surface aerators per unit volume P_V (= $P/(V\gamma(g\upsilon)^{1/3}$), methodology has been demonstrated to the save the energy consumption, defined by ε (=P_V /k), where K_La_{20} is the overall oxygen transfer coefficient at 20^{o}C, υ is kinematic viscosity of the water, N is the speed of the rotor, D is the diameter of the rotor, P is the input power available to the rotor, V is the volume of water and γ is the specific weight of the water. Present works demonstrate that while aerating a given volume of water at constant rotor speed to achieve a desired oxygen transfer coefficient (k) in square tank surface aerator, it is always economical to use a single tank rather than using a multiple numbers of smaller tanks.

Key words: energy conservation; oxygen transfer coefficient; power consumption; power per unit volume; surface aerator

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