GAS HOLD UP ON THE CULTIVATION OF A PETROLEUM-DEGRADING BACTERIAL CONSORTIUM

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Abstract

The hydrodynamic behavior of bubble column bioreactors (BCB) is strongly dependent on the bubbly flow regime. Therefore, the influence of superficial gas velocity (Ug) and Sauter mean diameter (d₃₂) on gas hold up (εg) was evaluated for the cultivation of a petroleum-degrading consortium. Hydrodynamic parameters were determined by photographic techniques. Also, the biomass cultivation was quantified by suspended solids formation (SS). Our findings indicated that the d₃₂ increased at high Ug values (0.9-1.2 cm s⁻¹), but decreased with the presence of Tween 20 surfactant (0-0.15 mL L⁻¹) in the model medium. An enhancement in the εg was observed at high Ug values (1.0-1.3 cm s⁻¹). Interestingly, εg values ranging from 0.02 to 0.024 reported a high concentration level of SS (8-10 g L⁻¹) during the hexadecane degradation. Particularly, εg value of 0.024 was a convenient level to cultivate the consortium resulting in changes in bacterial population distribution, due to oxygen and hydrocarbon bioavailability. According our results, the εg is proposed as key factor related to mass transfer phenomena and agitation on the cultivation of petroleum-degrading consortium.

Key words: biodegradation, bubble column bioreactor, consortium, gas hold up, petroleum

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