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## 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 ( $U_g$ ) and Sauter mean diameter ( $d_{32}$ ) on gas hold up ( $\epsilon_g$ ) 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  $d_{32}$  increased at high  $U_g$  values ( $0.9\text{-}1.2\text{ cm s}^{-1}$ ), but decreased with the presence of Tween 20 surfactant ( $0\text{-}0.15\text{ mL L}^{-1}$ ) in the model medium. An enhancement in the  $\epsilon_g$  was observed at high  $U_g$  values ( $1.0\text{-}1.3\text{ cm s}^{-1}$ ). Interestingly,  $\epsilon_g$  values ranging from 0.02 to 0.024 reported a high concentration level of SS ( $8\text{-}10\text{ g L}^{-1}$ ) during the hexadecane degradation. Particularly,  $\epsilon_g$  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  $\epsilon_g$  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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