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kLa gas-liquid mass transfer coefficient simulation using CFD in helical ribbon impeller

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In the present study a CFD simulation (Computational Fluid Dynamics) applied to non-newtonian fluids was developed in order to characterize the gas-liquid mass transfer in a 10 L bioreactor equipped with a helical ribborn impeller. The kLa mass transfer coefficient was estimated Based on CFD results. The operating conditions chosen were defined by typical settings used for culturing fungi organism. Turbulence, rotating flow, bubbles breakage and coalescence were simulated by using the k-e, MRF (Multiple Reference Frame) and PBM approaches, respectively. The numerical results from different operational conditions are compared by evaluating its effect on kLa. Interested by these simulated results CFD simulations are qualified as a very promising tool not only for predicting gas-liquid hydrodynamics but also for finding design requirements that must be implemented to optimize an aerobic bioprocessing useful for non-newtonian applications which are characterized by the constrain of achieving relatively high stirring conditions and avoiding cellular damage due to hydrodynamic conditions.

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