

## Prediction of Oxygen Transfer and Gas Hold-Up in Pneumatic Bioreactors Containing Viscous Newtonian Fluids

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**Abstract :** Pneumatic reactors have been widely employed in various sectors of the chemical industry, especially where are required high heat and mass transfer rates. This study aimed to obtain correlations that allow the prediction of gas hold-up ( $\epsilon$ ) and volumetric oxygen transfer coefficient (kLa), and compare these values, for three models of pneumatic reactors on two scales utilizing Newtonian fluids. Values of kLa were obtained using the dynamic pressure-step method, while  $\epsilon$  was used for a new proposed measure. Comparing the three models of reactors studied, it was observed that the mass transfer was superior to draft-tube airlift, reaching  $\epsilon$  of 0.173 and kLa of 0.00904s<sup>-1</sup>. All correlations showed good fit to the experimental data ( $R^2 \geq 94\%$ ), and comparisons with correlations from the literature demonstrate the need for further similar studies due to shortage of data available, mainly for airlift reactors and high viscosity fluids.

**Keywords :** bubble column, internal loop airlift, gas hold-up, kLa

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