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Investigation of the Mass Transfer Ratio in a Bubble Column Operated with Various Organic Liquids and Mixtures Under Ambient Conditions

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In this work, for the first time, the dependence of the mass transfer (MT) ratio (kLa coefficient to overall gas holdup) as a function of the superficial gas velocity UG in seven organic liquids was studied. The volumetric liquid-phase MT coefficients kLa were recorded (by means of a polarographic oxygen electrode) in a bubble column (0.095 m in ID) equipped with a single tube (∅3.0 mm in ID) as a gas sparger. It was found that the MT ratio decreases monotonically through all main flow regimes. Both the constant and the exponent of the empirical correlation between the MT ratio and UG were analyzed, and it was found that they depended in a complicated fashion on the Schmidt number, Sc. In three different regions of the Sc number, potential new correlations were discussed. The main conclusion from this work is that the MT ratio is not constant in the heterogeneous regime as reported previously by other researchers. In the case of four binary mixtures between benzene and cyclohexane, it was also found that the MT ratio decreased monotonically as a function of the superficial gas velocity, UG. The effects of both liquid viscosity and surface tension on the MT ratio were also investigated.

Metryczka

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