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Zedníková, Mária
2018

Dostupný z <http://www.nusl.cz/ntk/nusl-387480>

Dílo je chráněno podle autorského zákona č. 121/2000 Sb.

Tento dokument byl stažen z Národního úložiště šedé literatury (NUŠL).

Datum stažení: 10.04.2024

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Validation of Dynamic Pressure Method for measurement of volumetric mass transfer coefficient in bubble column

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The review about the measuring methods of mass transfer parameters in gas-liquid contactors/reactor shows that the available experimental data are hardly comparable due to the various operating conditions investigated by different authors (type or contactor/reactor, in the case of bubble column: bubble column size, type of gas distributor, coalescence nature of the liquid phase, hydrodynamic flow regime, etc.). Moreover, the value of the volumetric mass transfer coefficient obtained experimentally is very sensitive to experimental method and to the physical model used in its evaluation [1,2]. The dynamic pressure method (DPM) is one of the methods providing physically correct k_{La} values not only in lab-scale contactors but also in pilot-scale reactors [1,3].

In present experiments, DPM was employed in a laboratory-scale bubble column with both coalescent and non-coalescent phase and tested in the pure heterogeneous flow regime. The method was successfully validated by testing the two aspects known to affect the k_{La} values: i) pure oxygen absorption versus simultaneous oxygen and nitrogen absorption and ii) ideal versus non-ideal pressure step during the measurements. Obtained results show that the DPM is suitable measuring the mass transport in bubble columns and to provide reliable data of volumetric mass transfer coefficient.

References

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