中国化学工程学报 2006 14(5): 604-610 ISSN: 1004-616x CN: 44-1063/K

TRANSPORT PHENOMENA & FLUID MECHANICS

气升式环流反应器内传质行为的分析与测量

张同旺, 王铁峰, 王金福

Beijing Key Lab of Reaction Engineering & Technology, Tsinghua University, Beijing 100084, China

收稿日期 修回日期 网络版发布日期 接受日期

摘要 Inter-phase mass transfer is important to the design and performance of airlift loop reactors for either chemical or biochemical applications, and a good measurement technique is crucial for studying mass transfer in multiphase systems. According to the model of macro-scale mass transfer in airlift loop reactors, it was proved that the airlift loop reactor can be regarded as a continuous stirred tank reactor for measuring mass transfer coefficient. The calculated mass transfer coefficient on such a basis is different from the volumetric mass transfer coefficient in the macro-scale model and the difference is discussed. To describe the time delay of the probe response to the change of oxygen concentration in the liquid phase, a model taking into account the time constant of response is established. Sensitivity analysis shows that this model can be used to measure the volumetric mass transfer coefficient. Applying this model to the measurement of volumetric mass transfer coefficient in the loop reactor, results that co-incide with the turbulence theory in the literate were obtained.

关键词 airlift loop reactor; mass transfer model; sensitivity analysis;

分类号

DOI:

Analysis and Measurement of Mass Transfer in Airlift Loop Reactors

ZHANGTongwang, WANGTiefeng, WANGJinfu

Beijing Key Lab of Reaction Engineering & Technology, Tsinghua University, Beijing 100084, China

Received Revised Online Accepted

Abstract Inter-phase mass transfer is important to the design and performance of airlift loop reactors for either chemical or biochemical applications, and a good measurement technique is crucial for studying mass transfer in multiphase systems. According to the model of macro-scale mass transfer in airlift loop reactors, it was proved that the airlift loop reactor can be regarded as a continuous stirred tank reactor for measuring mass transfer coefficient. The calculated mass transfer coefficient on such a basis is different from the volumetric mass transfer coefficient in the macro-scale model and the difference is discussed. To describe the time delay of the probe response to the change of oxygen concentration in the liquid phase, a model taking into account the time constant of response is established. Sensitivity analysis shows that this model can be used to measure the volumetric mass transfer coefficient. Applying this model to the measurement of volumetric mass transfer coefficient in the loop reactor, results that co-incide with the turbulence theory in the literate were obtained.

Key words airlift loop reactor; mass transfer model; sensitivity analysis;

通讯作者:

张同旺 wangjf@flotu.org

作者个人主页: 张同旺; 王铁峰; 王金福

扩展功能

本文信息

Supporting Info

PDF(279KB)

HTML中文(0KB)

免费大邮

服务与反馈

把本文推荐给朋友

加入我的书架

加入引用管理器

引用本文

Email Alert

文章反馈

浏览反馈信息

相关信息

本刊中 包含“airlift loop reactor”的 相关文章

本文作者相关文章

张同旺

王铁峰

王金福