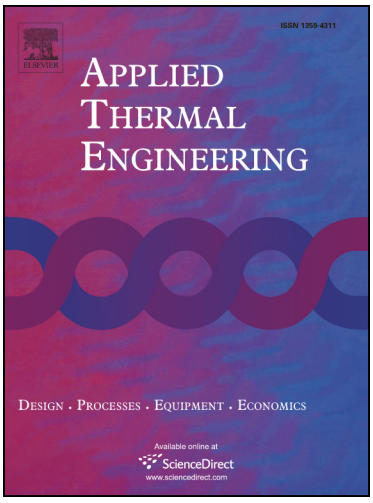

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Flow Pattern and CO_2 Absorption in a Falling Film Reactor with Mixed Aqueous Solution of Ionic liquid and MEA

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Abstract

This work dealt with the effect of counter-current gas flow on the flow pattern transitions and CO_2 absorption with the mixed aqueous solution of ionic liquid and MEA. The falling film was observed to take the form of "corner rivulet flow (denoted as CRF)", "falling film flow with dry patches (denoted as FDP)" or "complete falling film flow (denoted as FFP)". The flow patterns are significantly different between the cases of increasing the liquid flow rate gradually and decreasing the liquid flow rate gradually. The critical flow rate enlarged due to the increasing gas flow rate. The absorption rate R_A increased with increasing liquid flow rate under the flow patterns of CRF and FDP. The utilization rate reached a peak at the critical liquid flow rate $Q_{CRF,CFF-FDP}$. Liquid mass transfer coefficient decreased with the increasing liquid flow rate under the flow patterns of CRF and FDP.

Keywords: flow pattern; CO_2 absorption; falling film; ionic liquid; MEA

1. Introduction

Carbon dioxide (CO_2) is widely known as a representative greenhouse gas that causes global warming and climate change problems. The reduction of CO_2 has attracted much attention. One of the commercially utilized technologies for CO_2