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Mass transfer intensification in a novel airlift reactor assembly with helical sieve plates

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HIGHLIGHTS

- A novel airlift reactor assembly with helical sieve plates was developed.
- Gas holdup and volumetric mass transfer coefficient were significantly intensified.
- Helical sieve plate structure and reactor performance were related to each other.
- Bubble size decreased and its distribution in the reactor was narrow.

GRAPHICAL ABSTRACT

Position of Graphical Abstract

ABSTRACT

A novel airlift reactor (ALR) assembly with helical sieve plates (HSPs) in the riser section was developed to intensify gas–liquid mass transfer process. The mass transfer and mixing characterization of the ALR assembly with different HSP structures was analyzed and compared using gas holdup, volumetric mass transfer coefficient, bubble velocity, and mixing time as assessment parameters. With optimized HSP, the gas holdup and volumetric mass transfer coefficient of the reactor were significantly increased by 38%–53% and 76%–144%, respectively, compared

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