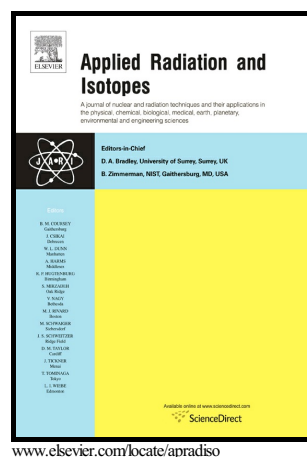


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Investigation of holdup and axial dispersion of liquid phase in a catalytic exchange column using radiotracer technique

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Abstract: Holdup and axial dispersion of liquid phase in a catalytic exchange column were investigated by measuring residence time distributions (RTD) using a radiotracer technique. RTD experiments were independently carried out with two different types of packings i.e. hydrophobic water-repellent supported platinum catalyst and a mixture (50 % (v/v)) of hydrophobic catalyst and a hydrophilic wettable packing were used in the column. Mean residence times and hold-ups of the liquid phase were estimated at different operating conditions. Axial dispersion model (ADM) and axial dispersion with exchange model (ADEM) were used to simulate the measured RTD data. Both the models were found equally suitable to describe the measured data. The degree of axial mixing was estimated in terms of Peclet number (Pe) and Bodenstein number (Bo). Based on the obtained parameters of the ADM, correlations for total liquid hold-up (H_T) and axial mixing in terms of Bo were proposed for design and scale up of the full-scale catalytic exchange column.

Keywords: Catalytic exchange column, Trickle bed contactor, Residence time distribution, Hydrophobic, Hydrophilic, Radiotracer, Bromine-82, Mean residence time, Holdup, Axial dispersion model, Axial dispersion with exchange model, Peclet number, Bodenstein number

Highlights:

- Hold-up and axial dispersion in a catalytic exchange column were measured.
- ADM and ADEM were used to simulate the RTD data
- Both the models were found suitable to describe RTD data
- Correlations for hold-up and axial mixing were proposed

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