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Evaluation of MellapakPlus 252.Y: pressure drop and mass-transfer characteristics

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Structured packings such as MellapakPlus 252.Y belong to a modern generation of high-capacity column internals intended to provide effective gas-liquid contacting while avoiding hydraulic constraints. Thanks to their optimized corrugated-sheet architecture and inherently low pressure drop, MellapakPlus packings are commonly implemented in absorption, distillation, and stripping, where both high throughput and strong mass-transfer performance are required. The 252.Y configuration offers a well-balanced combination of specific surface area, capacity, and operational versatility, making it attractive for applications targeting high separation efficiency at reduced energy demand. Although MellapakPlus packings are widely used in industry, high-quality experimental hydrodynamic and mass-transfer data remain valuable for the validation of predictive tools and for improving design correlations. This work contributes by delivering a detailed experimental evaluation of the hydraulic and mass-transfer characteristics of MellapakPlus 252.Y under controlled absorption conditions.

Hydraulic performance was quantified by pressure-drop measurements in an air-water system over a broad range of gas and liquid loads. Mass-transfer properties were determined using three established reference systems: oxygen desorption from water for estimating the liquid-side volumetric mass-transfer coefficient (k_La), chemisorption of SO_2 into aqueous NaOH to obtain the gas-side volumetric mass-transfer coefficient (k_Ga), and chemisorption of CO_2 into aqueous NaOH for determining the effective interfacial area (a). To remove the influence of inlet and outlet regions, all mass-transfer parameters were evaluated using the subtraction method.

Experiments were performed in an atmospheric column with an internal diameter of 0.3 m and with packed-bed heights varied from 0.42 m to 1.3 m. The resulting dataset served to identify the hydraulic parameters (C_S, C_{Fl}, and $C_{P,0}$) and the mass-transfer parameters (C_L and C_V) of the Billet and Schultes (1999) model. The derived parameter set provides a consistent description of MellapakPlus 252.Y performance and supports reliable design and scale-up of absorption equipment employing this structured packing.