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在高压下规整填料中的流动实验研究

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摘要 Both distillation performance and hydrodynamic study for backmixing by tracer technique were carried out in a high-pressure packed column with 0.15 m inner diameter over a wide range of operating conditions. Isobutane and n-pentane are employed as test mixture in the distillation experiment and air/water is used for the hydrodynamic study. The column is installed with Mellapak 350Y structured packing and the total packing height is 2.0 m. With the increasing operating pressure, the separation efficiency increases slightly while the F-factor corresponding to the maximum efficiency at each pressure is descending. It is noted that, at all operating pressures, with the increase of F-factor, the packing efficiency is slightly higher up to the flooding point. The application of SRP model to high-pressure distillation gives much lower values of HTUDG than those obtained experimentally. An additional term, the height of mixing unit, is introduced to correct the SRP model and improve its accuracy at high pressure. From the tracer experiments, the height of mixing unit for gas phase was found to be larger than that for the liquid phase. From this viewpoint, it is believed that the gas phase backmixing givesmore unfavorable influence on the separation efficiency in comparison with liquid phase.

关键词 高压精馏工艺 轴向扩散 混合工艺 分离系统

分类号

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An Experimental Study of Structured Packing in High Pressure Services

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Abstract Both distillation performance and hydrodynamic study for backmixing by tracer technique were carried out in a high-pressure packed column with 0.15 m inner diameter over a wide range of operating conditions. Isobutane and n-pentane are employed as test mixture in the distillation experiment and air/water is used for the hydrodynamic study. The column is installed with Mellapak 350Y structured packing and the total packing height is 2.0 m. With the increasing operating pressure, the separation efficiency increases slightly while the F-factor corresponding to the maximum efficiency at each pressure is descending. It is noted that, at all operating pressures, with the increase of F-factor, the packing efficiency is slightly higher up to the flooding point. The application of SRP model to high-pressure distillation gives much lower values of HTUDG than those obtained experimentally. An additional term, the height of mixing unit, is introduced to correct the SRP model and improve its accuracy at high pressure. From the tracer experiments, the height of mixing unit for gas phase was found to be larger than that for the liquid phase. From this viewpoint, it is believed that the gas phase backmixing givesmore unfavorable influence on the separation efficiency in comparison with liquid phase.

Key words high-pressure distillation; structured packing; axial dispersion; height of mixing unit; separation efficiency.

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