

Clean utilization of olefins in FT synthetic oil: Adsorption separation of C8 α -olefin/paraffin by simulated moving bed

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Abstract

Long chain α -olefin is a high value intermediate of organic synthesis. The separation of α -olefin/paraffin with low energy consumption is a challenging problem in the process of efficient utilization of Fischer-Tropsch synthesis products. Adsorption separation is a promising alternative to the traditional energy-intensive distillation. Herein, a simulated moving bed unit was built and applied for the separation of C8 α -olefin/paraffin using NaX zeolite as adsorbent and cyclohexane as desorption reagent. Initial SMB parameters were determined reasonably by fixed bed chromatography pulse experiment and safety factor method. The parameters, including switching time, flow rates, and configuration, were further optimized by SMB experiments. The separation with low cost and energy consumption was developed with a 2-3-2-1 SMB configuration. The obtained purity of C8 α -olefin was 96.3% and the yield was 90.4%. The parameter design and optimization lay an important foundation for the industrial implementation of α -olefin/paraffin adsorption separation in the future.

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