

150a Propylene Separation from C3 Fractionator Feed Gas by Pressure Swing Adsorption

Jong-Nam Kim, Chang Hyun Ko, Jong-Ho Park, Sang-Sup Han, Soon-Haeng Cho, and Seong Jun Lee

Propylene is one of basic feed-stocks and is used in huge quantities in petrochemical industry. The separation of propylene-propane mixtures have been performed by a highly energy-intensive distillation process at 40 oC and 240 psig in a column of 220 trays because of the close relative volatility of the components. A number of alternative methods have been investigated for olefin/paraffin separation and adsorptive separation appears to be a promising option. In this work, the separation of propylene-propane mixtures was performed by pressure swing adsorption using a π -complexation sorbent (AgNO₃/aluminosilica). Adsorption isotherms and uptake curves of C₃H₆ and C₃H₈ were measured on the AgNO₃/aluminosilica. A three-bed and six-step PSA cycle was used for propylene separation from C₃ fractionator feed gas in naphtha cracking center. The PSA unit was operated in the pressure range of 35 mmHg ~ 980 mmHg and the performance was examined with the adsorber temperature range of 25 oC ~ 80 oC. The best PSA performance was shown at the adsorber temperature of 70 oC. In this case, propylene product purity of 99.5% was obtained with the recovery of 96% and the productivity of 3.56 gmol/(kg.h).