

Effects of the Residence Time in 4-bed Pressure Swing Adsorption

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The residence time in a bed is defined as the ratio of the bed volume to the volumetric feed gas flow rate expressed as the bed volumes per unit time. Sufficient residence time should be provided, so that the desired product purity can be achieved. If the residence time is too short, there will be no significant adsorption. Increase in residence time can be made by reducing the feed rate or by increasing the bed volume. Since the feed rate is decided by the desired capacity of the unit, required residence time can be achieved by changing the bed volume. However, in an existing unit, residence time can be altered only by adjusting feed rate or feed pressure or both. In this study, a four-bed pressure swing adsorption(PSA) process was to study separation of hydrogen from multi-component gas onto activated carbon and zeolite 5A. The effects of the residence time on the process performance were evaluated.