

Synthesis/Optimization of Actual Pressure Swing Adsorption (PSA) Process Unit by Simulation Based Synthesis, Design and Optimization

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Simulation is a useful aid in synthesis, design and operating parameter optimization tasks and the objective of this study is to demonstrate its use for Pressure Swing Adsorption (PSA) processes. A simulation based on-line synthesis, design and optimization strategy was developed by the authors for PSA processes and was demonstrated using a rigorous simulation (called *Process*) of a flexible PSA unit as actual unit and a less rigorous model as its simulation^{1,2}. In the present study, the process emulation is replaced by an actual two-bed PSA unit. Separation of air into nitrogen free oxygen as raffinate stream and enriched nitrogen as extract stream using 5A zeolite as adsorbent has been chosen as a specific system for testing and developing various strategies. Eventhough, the units have limitations with regards to instrumentation and automation, these limitations bring these units closer to the commercial scale units for oxygen production and their optimization with all these limitations thus makes practical sense. The findings based on this study shows the applicability of this approach to other commercial PSA processes.

References

1. Rajasree, R., 1997, *Computer aided synthesis, design and optimization of pressure swing adsorption (PSA) processes*, Ph.D. Thesis, Indian Institute of Technology, Powai, Bombay, India.
2. Rajasree, R., Moharir, A.S., 2000, Simulation based synthesis, design and optimization of pressure swing adsorption (PSA) processes, *Computers and Chemical Engineering*, 2000, 24, 2493-2505.