

Study for Comparison of Membrane Process Simulation and Experiment in Multi-stage Process

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To date, developing membrane process models and a validation of developed models with experimental results were limited to only a single-stage process. However, due to some limitations of single membrane process, an application of multi-stage membrane process is required for acquiring high purity and high recovery from low concentration of a target component. Here, we developed the multi-stage process model with superstructure approach and carried out rigorous process validation of 2-stage process using estimated parameters from commercial membrane module in a case of CO<sub>2</sub>/N<sub>2</sub> binary gas mixture. An optimization based on main capital cost and electric usage was applied to evaluate feasible process configurations and operating conditions. Furthermore, the optimized process was also validated in the same structure and operating conditions and showed within a 4 % error of CO<sub>2</sub> purity and recovery.

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