The Separative Performance of Modules with Polymeric Membranes for a Hybrid Adsorptive/Membrane Process of CO2 Capture from Flue Gas

Publication date:	28.10.2020
Publication title:	The Separative Performance of Modules with Polymeric Membranes for a Hybrid Adsorptive/Membrane Process of CO2 Capture from Flue Gas
Authors:	Marek Tańczyk, Aleksandra Janusz-Cygan, Jolanta Jaschik, Artur Wojdyła
Journal information:	Membranes

Commercially available polymeric membrane materials may also show their potential for CO2 capture by the association of the membrane process with other separation techniques in a hybrid system. In the current study, PRISM PA1020/Air Products and UBE UMS-A5 modules with membrane formed of modified polysulfone and polyimide, respectively, were assessed as a second stage in the hybrid vacuum swing adsorption (VSA)–membrane process developed in our laboratory. For this purpose, the module permeances of CO2, N2, and O2 at different temperatures were determined, and the separation of CO2/N2 and CO2/N2/O2 mixtures was investigated in an experimental setup. An appropriate mathematical model was also developed and validated based on experimental data. It was found that both modules can provide CO2-rich gas of the purity of > 95% with virtually the same recovery (40.7−63.6% for maximum carbon dioxide content in permeate) when fed with pre-enriched effluent from the VSA unit. It was also found that this level of purity and recovery was reached at a low feed to permeate the pressure ratio (2−2.5) in both modules. In addition, both modules reveal stable separation performance, and thus, their applicability in a hybrid system depends on investment outlays and will be the subject of optimization investigations, which will be supported by the model presented and validated in this study.

Metryczka

Published by:	Marek Tańczyk
Published at:	11.05.2026 10:36
Number of views:	10