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Capture of carbon dioxide from natural gas through polymeric hollow fiber membrane contactor

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Carbon dioxide is the principal greenhouse gas emitted through human activities. While carbon dioxide releases come from a diversity of natural sources, human-related emissions are responsible for the increase that has occurred in the atmosphere since the industrial revolution. The most effective way to reduce carbon dioxide emissions is to reduce fossil fuel consumption and capture CO_2 from natural gas and flue gas. Conventionally, packed columns are used for the absorption of carbon dioxide from natural gas and flue gas. The gas/liquid contact is performed within an absorption tower. The tower consists of a packed column over which the absorption liquid and gas are flowing in counter current mode of operation. The large active area required for CO_2 mass transfer efficiency from the gas into the liquid prompts the use of huge absorption tower, which extremely increases the cost of the process. In recent years, hollow fiber membrane contactor technology has been considered a promising alternative to conventional absorption technologies, since it offers higher absorption efficiency and avoids common operating problems found in traditional packed columns. Gas-liquid hollow fibers membrane contactors offer larger gas/liquid contacts are per unit volume. The aim of this work is to develop a transient mathematical model and simulate the behavior of CO_2 removal by sodium hydroxide aqueous solution in hollow fiber membrane contactor module. The simulation results are compared with the experimental data and found to be in good agreement.

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