

Simulating Capture of CO₂ by membrane process using sweeping gas to reduce total energy

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The current membrane process uses compressor or vacuum pump to create pressure difference which consumes large energy. In this study, the proposed new system of membrane uses sweeping gas and avoid usage of compressor. Instead it applies a heat recovery system for regeneration of sweeping gas then circulate it to membrane for recapturing of CO₂. The aim of this study is to reduce the total energy and get >99 % CO₂ purity. From flash drum CO₂ free sweeping gas goes to heating medium while CO₂ stream goes to compression unit. For this system it is proposed to use a heat pump unit that couples the hot and cold streams to reduce the energy. From aspen plus simulation result, the total energy requirement is around 288 kWh. Further optimization and selection of appropriate sweeping gas that has low latent heat vaporization reduces the energy requirement. Under optimization the operating condition of membrane unit can be flexible 30°C to 80°C depending on sweeping gas boiling point.