Low-temperature vacuum stripping of CO_2 from aqueous amine solutions using thin-film silicalite-filled PDMS composite membranes

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Carbon dioxide (CO2) recovery by vacuum stripping technology using membranes was studied as analternative to the desorption process at low temperatures (below 120◦.C) in conventional aqueousamine absorption process. Composite membranes were prepared by coating hydrophobic silicalite-filledpolydimethylsiloxane (PDMS) layers on polyethylene (PE) porous supports and used as new mem-brane strippers for CO2recovery to prevent the typical pore wetting problem of hydrophobic porousmembranes. Aqueous 30 wt% solutions of monoethanolamine (MEA), diethanolamine (DEA). CO2stripping fluxes increased with increasing temper-ature and CO2loading of amine solutions as well as with decreasing stripping pressures because ofthe enhanced upstream and downstream driving forces. CO2stripping fluxes were much higher in theTEA and DEA solutions than in the MEA solutions. The thin-film silicalite-filled PDMS composite mem-branes showed excellent long-term stability in the vacuum stripping process when compared with porouspolytetrafluoroethylene (PTFE) membranes.