Use of Aminosiloxanes for CO$_2$ Capture in Gas-Treating Solvents

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Acid gas removal is an important challenge for the gas treating industry, requiring processes and technology capable of removing acid gases from feedstock while keeping operating and capital expenses low and allowing for flexibility due to changes in feedstock composition. Hybrid solvents, composed of a physical solvent and chemical solvent, offer excellent properties for gas treating applications in terms of energy savings versus chemical solvents and lower hydrocarbon co-absorption versus physical solvents. Previous work on hybrid solvents focused on chemical solvents such as alkanolamines, and polar physical solvents. Aminosiloxanes are a different class of solvents, comprised of a siloxane (Si-O) backbone with amine functionality in the molecule. Dimethylsiloxane polymers are known to have a high affinity for physical solubility of carbon dioxide, while the amine functionality allows for chemical absorption of carbon dioxide. In this study, we present thermophysical and calorimetric data for hybrid formulations using aminosiloxanes as both a chemical and physical solvent for CO2 capture.