Modeling of the Hydrazine-hydrate-based CO_2 Absorption Process for CO_2 Capture

황성준, 김희용, 김정환, 이광순*, 이규형, 이병노, 허남회
서강대학교
(kslee@sogang.ac.kr*)

The amine scrubbing process has been intensely researched as the most viable option for CO2 capture from coal-fired power plants. Monoethanolamine (MEA) is considered as a standard solvent, but the economy of MEA is limited due to high regeneration energy. In this study, the hydrazine-hydrate-based CO2 absorption process is proposed and modeled. It is regarded that the hydrazine-hydrate solvent has a great potential for CO2 capture since the solvent has similar characteristics to the piperazine in terms of heat of absorption, rate of absorption, water content, capture capacity, and viscosity. Moreover, it has a smaller molecular weight. Thermodynamic model for the hydrazine-hydrate solvent was established. Thermodynamic properties of the pure components and the binary component were applied to the model, and VLE data of the hydrazine-water-CO2 system was used to evaluate the eNRTL model. Experimental data from the wetted wall column were used to determine the reaction kinetics and associated parameter values. An Aspen process simulator was conducted by incorporating the thermodynamic and kinetic models into the simulator, and the process evaluation was conducted.