

## Process design and optimization of amine-based CO<sub>2</sub> capture processes

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Abatement of CO<sub>2</sub> emissions has become a global environmental issue. Post-combustion CO<sub>2</sub> capture using chemical absorbent is a mature method for CCS. This study deals with the modeling and simulation of CO<sub>2</sub> capture process with aqueous monoethanolamine (MEA), with the application of a commercial simulator UniSim Design®. In order to systematically improve energy efficiency of CO<sub>2</sub> capture process and to consider design options of structural modifications superstructure-based optimization technique is applied by minimizing total operating costs. The optimization is carried out by a stochastic solver within MATLAB®, linking with the simulator to determine optimal design configuration and operating conditions. The case study illustrates how the proposed modeling and optimization is effective for investigating design options for improving energy efficiency for amine-based CO<sub>2</sub> capture processes. Acknowledgement: This work was supported by the "Energy Efficiency & Resources Programs" of the Korea Institute of Energy Technology Evaluation and Planning (KETEP) grant funded by the Ministry of Trade, Industry and Energy of the Korean government (No. 20122010200071).