The use of aqueous ammonia is a promising option to capture carbon dioxide from power plants thanks to the potential low heat requirement during the carbon dioxide desorption compared to monoethanolamine (MEA) based process. The patented Chilled Ammonia Process developed by Alstom absorbs carbon dioxide at low temperature (2–10°C). The low temperature limits the vaporization of ammonia in the absorber and entails precipitation of ammonium carbonate compounds, thereby allowing high loadings of CO2. The process has thereby good perspectives. However, a scientific understanding and evaluation of the process is necessary. In this work, the performance of the carbon dioxide capture process using aqueous ammonia has been analyzed by process simulation. The Extended UNIQUAC thermodynamic model available for the CO2–NH3–H2O system has been implemented in the commercial simulator Aspen Plus® by using a newly developed user model interface (Maribo-Mogensen et al., submitted for publication). It allows for making equilibrium calculations using the advanced thermodynamic model together with the features of the commercial simulator. The present work deals with the results from the process simulation study. Two process configurations have been tested and a thorough sensitivity analysis of the main process parameters has been performed in order to analyze their effects on the heat and electricity requirement. This work confirms the high potential of the process. The heat requirement is found to be in the same range as the values reported recently for advanced amine processes. Assuming that cold cooling water is available, the electricity consumption remains limited. Hence the Chilled Ammonia Process is a promising option for post combustion carbon dioxide capture.

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