Analytic Method for Determining Optimal Stripper Pressure in CO_2 Capture and Liquefaction Process Using Monoethanolamine (MEA)

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Operation pressure of distillation column is one of the key variable for optimizing the required energy in CCS process. It affects the steam drag point in power plant, the regeneration energy in capture process and the compression energy in liquefaction process. A new analytic method, which is less dependent on simulation, for determining optimal stripper pressure for CCS process using MEA as an absorbent has been proposed. Total energy required is represented as a function of the pressure based on the equivalent work. The results shows that the compression work can be reduced at high pressure while that for reboiler increases and the total energy can be represented as a decreasing function with pressure. It is also revealed that a general analytic solution for optimal pressure including both the capture and the liquefaction process cannot be made, using approximation method and Abel-Ruffini theorem, while the expected value of total energy required in the possible range of the pressure can be estimated directly with given input variables.