

Thermodynamic and Economic Analysis of Process Simulation including Acid Gas Removal and Carbon Capture using Selexol for IGCC Power Plant

이우성, 이창하†

연세대학교

(leech@yonsei.ac.kr†)

The enormous CO<sub>2</sub> emission from coal combustion power plants raises the significant effects on global climate. But, due to the energy demand of present society, it is difficult to reduce significantly the utilization of fossils fuel. In this situation, integrated gasification combined cycle (IGCC) used coal takes spotlight for eco-friendly electricity generation. In this paper, integrated process including water-gas-shift-reactor, acid-gas-removal, carbon capture, sulfur-recovery-unit (SRU) was simulated for a 500MW IGCC power plant. The Selexol process of 90% and 95% carbon capture with higher than 95% CO<sub>2</sub> purity was simulated. Then, the thermodynamic and economic analysis of the process were performed and compared. The results indicated that 90% carbon capture in Selexol process leads to less energy consumption and cost than 95% carbon capture. Since each unit process was integrated with each other, the operation of each unit affected to the overall thermodynamic efficiency. Therefore, according to operating conditions of Selexol process, the efficiency variation of the SRU process was also investigated. Then, the exergy sankey diagram will be presented to suggest the strategy for the energy consumption minimization.