Integrated Process Design and Optimization of a Nitrogen Recovery in Natural Gas Processing with Varying Feed Composition

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In this study, two solutions for cryogenic nitrogen recovery integrated with NG liquefaction and NGL recovery are optimized using gProms Processbuilder powerful at complex optimization problem. The difference of each process is the way the nitrogen is removed from product LNG: Stand-alone and integrated one. These two processes are compared with each other in terms of plant specific energy (kWH/kgLNG) with respect to varying nitrogen content in the feed gas. In order for clear comparison, each process would meet the same product specification of NGL, LNG, and vent N2 stream. Consequently, as the nitrogen content in the feed increases, the specific energy also increases for both processes while the integrated configuration becomes more efficient than the other after around 15mol% N2. It should be noted that all of the optimization results for each process configuration are improved compared with those from other researches which have the similar configuration. From this study, we could be ready for recent trends occurring in natural gas processing which would last for more than decades and the way this study aimed could be reasonable guidelines for other chemical process designs.