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Optimal Cryogenic Processes for Nitrogen Rejection from Natural Gas

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Highlights

- The available cryogenic processes for nitrogen rejection from a natural gas feed are evaluated and compared in terms of their work requirements for varying nitrogen content in the feed.
- We merge all the four common nitrogen removal rejection configurations into two categories: single-column and multi-column processes (superstructure)
- Then we optimized them using the particle swarm optimization method to guarantee minimum work for given product and recovery/purity specifications.
- We present the process with minimum energy consumption for each nitrogen content in the feed.
- Finally, we use the concepts of exergy and the McCabe-Thiele diagram to explain why one process structure consumes less energy for the same separation than other alternative configurations.

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