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Simulation and optimization of an industrial gas condensate stabilization unit to modify LPG and NGL Production with minimizing CO_2 emission to the environment

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Abstract

In the present study, a great effort was made to improve the performance of an industrial LPG and NGL production unit in one of the major gas refinery located at Pars special economic zone in Iran. To demonstrate and obtain the optimal condition, the unit was simulated by using a steady-state flowsheet simulator, i.e. Aspen Plus, under different operational conditions. According to the simulation results, the unit was not operational under its optimal conditions due to some defects in the cooling system at top stage of the debutanizer tower (DBT) during hot and humid seasons. Additionally, the vapor pressure of produced LPG and accordingly the amount of its flaring were decreased by reducing the temperature of debutanizer tower at top stages. In the optimization section, the DBT condenser and reboiler heat duty, temperature, and pressure were regulated as adjustable parameters. The simulation results demonstrated that by applying the optimum suggestion in the hot months, the reflux stream temperature was reached about 55˚C which caused an efficient increment in LPG production (about 4%) with adjusting the propane component in LPG, based on the standard range as the plant criteria. Moreover, after applying modifications, about 750 tons of LPG product were saved from flaring during five hot months of the year, which resulted in 360,000$ extra annual income for the company. Finally, from environmental