PERFORMANCE OPTIMIZATION OF SHELL GASIFICATION AND CARBON RECOVERY SYSTEM OF A FERTILIZER PLANT USING GENETIC ALGORITHM TECHNIQUE

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Abstract

This paper discusses the performance optimization of shell gasification and carbon recovery system of a fertilizer plant using Genetic Algorithm. The fertilizer plant comprises of various systems viz. shell gasification and carbon recovery, desulphurization, co-shift conversion, decarbonation, nitrogen wash and ammonia synthesis etc. One of the most important functionaries of a fertilizer plant is shell gasification and carbon recovery system. The shell gasification and carbon recovery system of a fertilizer plant has five main subsystems, arranged in series. Considering exponential distribution for the probable failures and repairs, the mathematical formulation of the problem is done using probabilistic approach and differential equations are developed on the basis of Markov birth-death process. These equations are then solved using normalizing conditions so as to determine the steady state availability of the shell gasification and carbon recovery system. The performance of each subsystem of shell gasification and carbon recovery system of a fertilizer plant has also been optimized using Genetic Algorithm. So, the findings of the present paper will be highly useful to the plant management for the timely execution of proper maintenance decisions and hence to enhance the system performance.

Keywords: Performance Optimization, Shell Gasification and Carbon Recovery System, Genetic Algorithm.