Inert Gas Injection in Steam Reforming of Methane: Prospect for Energy Savings

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***Abstract*—**Synthesis gas manufacturing via steam reforming of hydrocarbons is an important industrial process. High endothermic nature of the process makes it one of the most costly and heat intensive processes. In the present work, composite effect of different inert gases on synthesis gas yield, feed gas conversion and temperature distribution along the reactor length has been studied using a heterogeneous model. Mathematical model was developed and validated against the existing process models. With the addition of inert gases, a higher yield of synthesis gas is observed. Simultaneously the rector outlet temperature drops to as low as 810 K. It was found that Xenon gives the highest yield and conversion while Helium gives the lowest temperature. Using Xenon as inert gas, 20 percent reduction in outlet temperature was observed compared to traditional case.

***Keywords*—**Energy savings, Inert gas, Methane, Modeling, Steam reforming