

## Comparison between Post- and Oxy-Combustion Systems in a Petroleum Refinery Unit Using Modeling and Optimization

**Authors :** Farooq A. Al-Sheikh, Ali Elkamel, William A. Anderson

**Abstract :** A fluidized catalytic cracking unit (FCCU) is one of the effective units in many refineries. Modeling and optimization of FCCU were done by many researchers in past decades, but in this research, comparison between post- and oxy-combustion was studied in the regenerator-FCCU. Therefore, a simplified mathematical model was derived by doing mass/heat balances around both reactor and regenerator. A state space analysis was employed to show effects of the flow rates variables such as air, feed, spent catalyst, regenerated catalyst and flue gas on the output variables. The main aim of studying dynamic responses is to figure out the most influencing variables that affect both reactor/regenerator temperatures; also, finding the upper/lower limits of the influencing variables to ensure that temperatures of the reactors and regenerator work within normal operating conditions. Therefore, those values will be used as side constraints in the optimization technique to find appropriate operating regimes. The objective functions were modeled to be maximizing the energy in the reactor while minimizing the energy consumption in the regenerator. In conclusion, an oxy-combustion process can be used instead of a post-combustion one.

**Keywords :** FCCU modeling, optimization, oxy-combustion, post-combustion

**Conference Title :** ICCPE 2017 : International Conference on Chemical and Process Engineering

**Conference Location :** Miami, United States

**Conference Dates :** December 14-15, 2017