Dynamic simulation of Fische-Tropsch reaction in a fixed bed reactor

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Recently, there has been a great progression in the resort to the Gas to Liquid (GTL) process technology to emerging and established oil and gas giants to replace the flaring of gas which has significant emissions concerns and the challenges in cost and technology associated with the transport of gas from offshore reservoirs. For this reason, there has been a growing number of research works in this field to optimize the process. At the heart of the GTL process is the Fischer-Tropsch process which converts syngas, predominantly made up of carbon monoxide and hydrogen to high hydrocarbons which can be further processed in derivatives like diesel and gasoline .In this work, a water cooled one dimensional pseudo-homogenous fixed bed reactor is dynamically modeled in which syngas of particular ratio of H2/CO is fed into the tube side to obtain a multicomponent mixture of hydrocarbons. The model was validated by simulating it with measured data from plant and was found to be consistent with less than 5% error margin. The transients of operating variables like temperature and pressure drop were analysed. Based on the results, the optimum operating conditions and the tube specifications were determined to be reliable and could be used for further research and development purposes. 감사의글 : 본 연구는 차세대 융복합 에너지물질 특화역구센터와 국방과학연구소의 지원으로 수행되었으며, 이에 감사드립니다.