

378a Modeling the Performance and Emissions of a Heavy Oil Gasification Plant by Hysys

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Abstract Gasification is a globally emerging technology in commercial markets for the conversion of a variety of feedstocks, including coal, heavy residue oil, biomass, solid waste, and others, to a variety of products, including electricity, steam, sulfur, transportation fuels, and other chemicals. One of the most developed and versatile gasification technologies is based upon entrained-flow reactors, which typically employ high temperatures and therefore can gasify a broad range of materials. In this study, we focus on the development of a comprehensive performance and emissions model of a gasifier-based Integrated Gasification Combined Cycle (IGCC) system using HYSYS. HYSYS is a steady-state chemical process simulator. The comprehensive model enables the evaluation of the interactions among various process areas within the IGCC system, as well as the performance of alternative system designs (e.g., based upon different gas turbine designs). The key process area performance models are described, as is the framework for estimation of air pollutant emissions model. In the paper, an example case study of the system model is presented to illustrate the typical performance and emissions of a heavy oil system for the production of power and elemental sulfur byproduct. Additional gasification systems models based upon entrained flow gasifiers are also under development. Thus, the model presented here is one of a set of complimentary models that enables comparisons of competing systems for strategic planning purposes.

Keywords: Modelling; residual , gasifier; Pressure; Kinetics; refinery, hysys