

From Fischer Tropsch rawproducts to Fischer Tropsch fuels: Development of an upgrading model and application to XtL processes

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Abstract

Within the project RENEW an upgrading model was developed and simulated with the process simulation software CHEMCAD.

Especially BtL concepts often finish after producing Fischer Tropsch rawproducts. In order to use the generated hydrocarbons as an engine fuel, it is necessary to improve yield and quality of the middle distillate cut. A suitable preparation, also called upgrading, can be done via hydrocracking. According to Shell's HPC-process, which is characterized as a mild hydrocracking, a simulation of an upgrading model was developed.

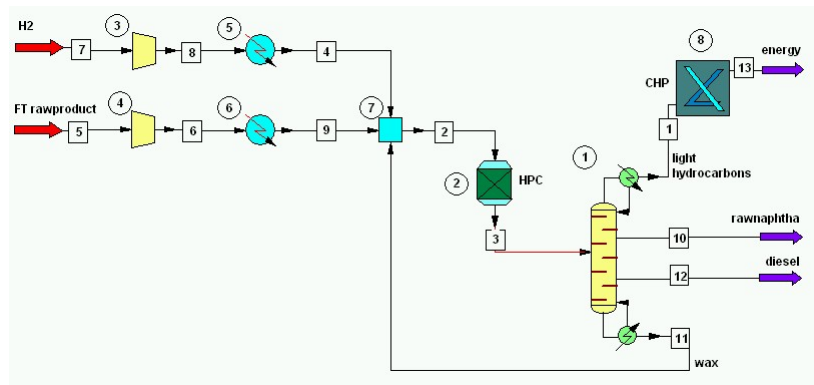


Figure 1: Excerpt from the CHEMCAD flowsheet

The model allowed - based on process parameters of the inputstreams - the calculation of the resulting amounts of diesel, rawnaphtha and electricity out of the arising offgases. In addition the energy and the hydrogen demand for the upgrading process can be calculated. Furthermore a classification in thermal and electric power demand is done. A plausibility check by means of energy consumption of different oil refineries validated the developed model.

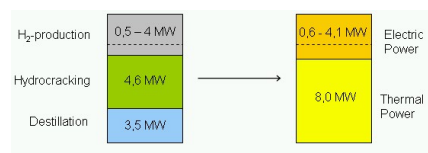


Figure 2: Example of the energy demand of an upgrading unit

Concluding a cost calculation for different plant sizes shows the corresponding capital and operation costs of such an upgrading unit. Beside closing the mass and energy balance, the developed model can be used for economic calculation of XtL concepts with the aim of maximised liquid fuel production, starting from Fischer Tropsch rawproducts.

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