

Article

Reaction Engineering of Direct Coal Liquefaction

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Abstract: Direct coal liquefaction has been studied and practiced since the 1930s. It was used in Germany during World War II to produce synthetic fuels when there was no oil allowed into the country. Since then, it has been studied in the United States and many different technologies have been investigated. Since the US is rich in coal resources, this is one way to be energy independent. Most of the development activity occurred in the 1980s and numerous technologies were studied, the most notable of these being H-Coal, Exxon Donor Solvent, Solvent Refined Coal, and Two Stage Liquefaction. The key elements of these technologies, particularly the reaction/reactor scheme, are discussed in this review.

Keywords: coal; liquefaction; reactors; kinetics; catalysis; deactivation; reaction engineering

1. Introduction

1.1. A Brief History of Coal Liquefaction

Interest in coal liquefaction has seen several high and low periods over the last 60 years. Direct coal liquefaction starts just prior to World War II by Germany, continues through the 1950s and 1960s with the research by the U.S. Bureau of Mines, and then hit an extensive pace following the Arab oil embargo of 1973. Since the early 1980s, interest has waned due to the decrease in crude oil prices, but the invasion of Kuwait by Iraq in 1990 caused the world to reevaluate their position and think about a national energy policy which will provide incentives to develop U.S. natural resources. The largest source of liquid hydrocarbons is crude oil and the United States has found and used up the cheap domestic crude that it once had. When demand exceeds supply, or a political or military action in one of the oil producing countries happens, the price of crude oil will increase. This stimulates alternative

Reaction Engineering In Direct Coal Liquefaction

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