

Catalysis in Coal Liquefaction

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Efficient catalysts, useful at a level less than 1%, can play an important role in the primary liquefaction of coal. Most of our present knowledge of efficient catalysts derives from empirical catalyst screening performed decades ago. By contrast, our understanding of the organic chemistry of coal is advancing at an exponential rate. This understanding will permit formulation of reaction mechanisms that are more soundly based than the ad hoc mechanisms suggested in the past. Still to be tackled is the question of determining the precise role of multifunctional, efficient catalysts in the many reaction steps that occur during coal liquefaction. This paper presents an eclectic consideration of catalyst systems involving tin, molybdenum, or iron which are known to be effective in coal liquefaction in small concentration. Some of the topics to be discussed are the importance of catalyst distribution, the fate of catalyst components during liquefaction, and the chemical role played by the catalyst in accelerating the reactions occurring in liquefaction. The last problem is the least understood and presents the greatest challenge for future research.