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A SURVEY OF THE SCIENTIFIC LITERATURE ON THE FISCHER-TROPSCH PROCESS

by

B. Dale, J. Rovtar Leach, C. W. Beckett and H. L. Johnston

Cryogenic Laboratory
Department of Chemistry
The Ohio State University

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ABSTRACT

The literature on the Fischer-Tropsch process has been reviewed. A brief historical review of this process is given. Methods for the preparation and purification of the synthesis gas, reaction conditions, methods for heat removal during the reaction and reaction products which have been described in the literature are presented and discussed.

The section on individual catalysts includes the most recent work reported on cobalt, nickel, iron, ruthenium, fluid and alloy skeleton catalysts.

Theories and experimental work on the reaction mechanism and kinetics of this process are discussed briefly.

FOREWORD

This literature survey was conducted under Contract W33-038-ac-17721 between the United States Air Forces and the Ohio State University Research Foundation (Project 319).

INTRODUCTION

The Fischer-Tropsch Process (synthesis of hydrocarbons, alcohols and other oxygen derivatives from carbon monoxide and hydrogen) was originated in Germany in 1926. Prior to 1940, the major development work was done in that country.

In the past decade, due to possible future needs for additional sources of motor fuel, extensive research programs have been initiated to investigate and perfect this process.

SUMMARY AND CONCLUSIONS

The catalysts which are being used in the Fischer-Tropsch synthesis are supported nickel, cobalt, iron and ruthenium catalysts. The most recent development is the use of a fluidized iron catalyst.

The reaction conditions depend entirely upon the choice of catalyst and the type of products desired. The source of the synthesis gas is either coal or methane. Methods for purification of synthesis gas have been much investigated, as all the catalysts used are extremely liable to sulfur poisoning.

The reaction mechanism has been studied extensively. Craxford has proposed the theory that the reaction proceeds through the intermediate formation of metallic carbide. Others have proposed an oxygen-containing, complex formed on the catalyst surface. Little work has been published on the kinetics of this reaction.

Since the process has commercial, as well as scientific interest, it is likely that much of the work that has been done has not been published in the open literature.