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***Characterization of waxes derived  
from Fischer-Tropsch reactors:  
Final report***

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CHARACTERIZATION OF WAXES DERIVED FROM  
FISCHER-TROPSCH REACTORS

FINAL REPORT

JANUARY 1988

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Prepared for  
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Assistant Secretary for Fossil Energy

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### ABSTRACT

Methods are described for improved characterization of Fischer-Tropsch (F-T) waxes. With these methods, detailed composition of F-T waxes can be determined, which may lead to improved understanding of the Fischer-Tropsch process and of the processing required to upgrade the waxes into higher value products. The characterization involved separation of the wax into neutral and polar fractions using high performance liquid chromatography on wide pore silica with 1.0% (volume) n-propanol in heptane as eluant at 60° to 80° C. The neutral fraction was further separated into alkanes and alkenes using a silver-loaded, sulfonic-acid-bonded silica column with 0.5 to 2.0% (volume) toluene in heptane as eluant at 60° to 80° C. The whole wax and separated fractions were analyzed by infrared, nuclear magnetic resonance, and mass spectrometry. Sample introduction in the mass spectrometry experiments was by probe microdistillation. Results indicated good separation with some very minor amounts of cycloparaffin and virtually no oxygenated compounds in the alkane fraction. The alkene fraction contained mostly alkenes with small amounts of alkanes or oxygen compounds and dioxygen compounds ( $C_nH_{2n}O_2$ ), probably esters or unsaturated diethers. Modifications to and extension of several computer programs made in the course of this study are described in an appendix. This computer software significantly decreased the time and effort involved in processing and interpreting the vast quantity of data acquired in the probe microdistillation mass spectral analysis of the F-T waxes and separated fractions.

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