V. CONCLUSIONS

The inherent non-selectivity of conventional Fischer-Tropsch catalysts for the conversion of synthesis gas to gasoline has been circumvented through the use of shape selective Pentasil catalysts. The Mobil M process which utilizes the Pentasil catalyst, ZSM-5, is limited by the thermodynamics and economics of the synthesis gas to methanol step. Bifunctional catalysts offer the advantage of converting synthesis gas to gasoline in a single reactor. Bifunctional ZSM-5 based catalysts produced by the direct synthesis approach appear to have occluded transition metal salts. Resulting from this occlusion the shape selectivity of the 10-membered ring causes a sharp cut-off at C_{12}. The crystal field effects on the reactant molecules artificially increase their pressure within the zeolite pore system to cause them to reside at near liquid density. This increase in pressure substantially increases the polymerization probability and prevents the production of C_1 to C_5 hydrocarbons. The shape selectivity prevents the formation of wax at this high polymerization probability.

The direct synthesis approach to bifunctional catalysts which has been largely overlooked by investigators to date, shows promise in providing an economically viable route from coal to gasoline.

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