

ENHANCED COAL LIQUEFACTION WITH HIGH BOILING SOLVENTS. D. D. Whitehurst. Mobil Research & Development Corp., P.O. Box 1025, Princeton NJ 08540

In the accelerated development of coal liquefaction since 1973, it has been the general practice to use distillates as recycle solvents. This stems from the earlier German experience where recycling asphaltenic products required more severe processing. Recently, it has been demonstrated that the inclusion of vacuum tower bottoms or of solvent fractionated heavy products in a recycle loop can produce dramatic process improvements.

An investigation of the mechanisms of coal conversion in high boiling solvents has been conducted using both model compounds, process derived materials, and fractions thereof. These studies identified polycondensed aromatics as effective solvent components. Due to their relative ease of hydrogenation and dehydrogenation they can effectively interact with hydroaromatic species in the coal (H-shuttling), with less active H donors or with hydrogen gas (H-transfer). Mineral matter catalysis can play an important role in these reactions.

Polyfunctional components have a propensity for promoting char formation and can produce adverse reactants. Information of this type can lead to identification and generation of optimal recycle solvent composition.

These studies show that the mechanistic pathways discernible from the model compound studies and the behavior of different chemical classes in heavy process solvents can lead to improvements in coal liquefaction processes.