SOME NEW EVIDENCE PERTAINING TO THE CHEMISTRY AND MECHANISMS OF COAL LIQUEFACTION.

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Experimental observations have indicated that in solvent extraction and/or catalytic hydrogenation of bituminous coal in the range 400 - 500°C as much as 20 - 30% of the radical stabilization to produce liquid products involves hydrogen from the coal (i.e. coal pyrolysis reactions). Pyrolysis of a high volatile bituminous coal in this temperature range in a TGA apparatus with small samples (e.g. 10 mg), rapid heat-up (1 - 2 minutes) and continuously recorded weight change follows second order kinetics during 60 - 90% of the product evolution. A model compound with structure such that its pyrolysis is intended to simulate coal pyrolysis has been synthesized and pyrolyzed. The products of pyrolysis of this compound have been analyzed by MS and GC. Reaction kinetics are examined. Implications relative to coal pyrolysis kinetics and reaction paths are discussed. Reaction paths in the catalytic hydrogenation of linear (anthracene) and nonlinear (phenanthrene) condensed aromatics are considered as indicated by GC analysis of the products of these reactions.