A KINETIC STUDY OF THE HYDROGENATION OF BITUMINOUS COAL

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Abstract

The catalytic hydrogenation of several coals from the western United States has been investigated in the temperature range 350° to 500°C utilizing hydrogen pressures up to 3500 psi. Yields of liquids plus gases up to 82 percent have been obtained utilizing ammonium molybdate catalyst. The reaction is observed to be second order over most of the time range at lower temperatures, with activation enthalpy of 39 kcal per mole and entropy of activation of -17 entropy units. A first order reaction was observed at lower temperatures at times greater than about three hours, with activation enthalpy of 9 kcal per mole and entropy of activation of -56 entropy units. Possible mechanisms are discussed.