

HYDROCRACKING OF COAL S. A. Oader, E. A. Everett, A. Basu and W. H. Wiser, Department of Mining, Metallurgical and Fuels Engineering, University of Utah, Salt Lake City, Utah 84112.

A subbituminous coal was hydrocracked with and without catalysts in the temperature range 450°-550°C under 1000-4000 psi hydrogen pressure. In the thermal hydrocracking experiments, conversion increased with reaction temperature and a coal conversion of about 40% was obtained at 10 minutes residence time. Hydrogen pressure did not effect the conversion to any significant extent. In the catalytic hydrocracking experiments, physical mixtures of coal and catalysts were heated under hydrogen pressure at residence times of up to 10 minutes. Reaction temperature and pressure increased the conversion and a coal conversion of about 90% was obtained at a temperature of 550°C under 4000 psi hydrogen pressure. Catalytic activity varied in the order  $\text{CoS} > \text{WS}_2 > \text{FeS}$ . Thermal and catalytic coal hydrocracking data were evaluated by first order kinetics and apparent activation energies of 13-15 K calories/gram mole were obtained in the noncatalytic hydrotreatment of coal in the pressure range 2000-4000 psi. But in catalytic hydro-treatment, activation energies varied significantly with pressure. At 2000 psi, only an activation energy of about 5 K cal/gram mole was obtained whereas at 3000 and 4000 psi, activation energies were found to be about 26 and 27 K cal/gram mole respectively. Some data on hydrocracking of coal in a fluid bed reactor were also presented.