THE GEOCHEMISTRY OF COALS: A CHARACTERISTIC FUNDAMENTAL IN DETERMINING LIQUEFACTION BEHAVIOR. P. H. Given, A. Davis and R. G. Jenkins. College of Earth and Mineral Sciences, Pennsylvania State University, University Park, PA 16802, U.S.A.

The characteristics of coals have been determined by a variety of factors, such as the character of the environment of deposition and temperature/time/pressure history. The varying relative importance of these factors has produced an extraordinary level of diversity in the world's coal reserves. The coals of the geographical area of the U.S. exhibit a wide variety of liquefaction characteristics. Data comprising conversion in coal/tetralin interactions and 14 other properties for a set of 104 coals had to be partitioned by cluster analysis into 3 more homogeneous populations before valid regression analyses could be performed, and the multiple regression analyses predicting conversion called out a different selection of properties for each group. The coal properties mostly responsible for the partitioning into groups were contents of sulfur and of carbon, and the groups consisted largely, but not entirely, of coals from different geological provinces. The inorganic matter in coals is of various types and its nature is determined by the geology and geochemistry of the basin in which a coal is formed. It importantly influences such diverse phenomena as the catalytic effect of coal minerals and the extent of abrasion or erosion of valves and pipework in commercial reactors. Experience in pilot plants has shown a widely varying incidence of problems due to deposition of largely inorganic or largely organic solids in the reactor, both phenomena being dependent on the degree of metamorphism of the coal, the geochemistry of the inorganic matter and the petrography of the coal, the latter property being a function of the geochemistry of the original peat swamp.