MATHEMATICAL MODEL OF BITUMINOUS COAL PYROLYSIS--TAR FORMATION AND EVOLUTION. M.W. Zacharias and J.B. Howard. Department of Chemical Engineering, Massachusetts Institute of Technology, Cambridge, Massachusetts 02139

A mathematical model of the rapid pyrolysis of caking coal has been fitted to extensive data on a Pittsburgh Seam coal pyrolyzed under wide ranges of conditions in a laboratory batch-sample reactor. The model includes an improved description of the role of mass transfer and secondary reactions and offers a means for the prediction of pressure effects on product yields. According to the model, a coal particle decomposes to form tar, lighter volatiles and char. The primary tar may evaporate and diffuse away from the particle or undergo secondary reactions leading to lighter volatiles and coke. The model is quite successful in predicting tar yields at pressures ranging from vacuum to 69 atm, although the predictions at the highest pressure are lower than the experimental yields, particularly at low temperatures. Possible explanations for this discrepancy will be presented. Results from application of the model indicate that mass transfer limitations are negligible under vacuum conditions. As the pressure is increased, tar evolution becomes limited by diffusion into the bulk reactor gas.