

## **Functional Group Chemistry of Southern Indiana Pennsylvanian Coals and Implications for Coking.**

By

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Fourier Transform Infrared Spectroscopy (FTIR) is a valuable technique for investigating the functional group chemistry of coals. Although FTIR has been used successfully in many areas of coal science, it has not yet been applied specifically to studies of coal coking properties. The coals under study by the author are from the Indiana portion of the Illinois Basin, and are of similar rank (high volatile bituminous), with one exhibiting superior coking properties compared to the other. FTIR work on vitrinite separates from each coal is hoped to reveal differences in functional group chemistry that could then be linked to their differing coking properties. Of special interest will be the aliphatic and oxygen bearing functional groups. It has been suggested that enrichment in aliphatic structures is related to greater plasticity for vitrinites. Highly branched aliphatic structures will have lower bond dissociation energies, indicating that the bonds within it are more readily broken than in non-branched versions. Vitrinite containing an abundance of these branched aliphatic chains may have a lower initial softening temperature during coking, thus improving the plasticity of the coal in general and producing a better quality coke. Relating functional group abundances in vitrinite to coking behavior will help advance understanding of the roles each coal maceral plays during carbonization, and may lead to the refinement of coking property prediction techniques currently used in the steel industry.