338c Sld Adsorption Model of Pure Coalbed Gases on Dry Argonne Premium Coal Matrices

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Previously, as part of our efforts to model enhanced coalbed methane recovery and CO2 sequestration in coalbeds, we have investigated the pure adsorption isotherm behavior of five dry coals; namely, Illinois #6, Wyodak sub-bituminous, Pocahontas, Beulah Zap, and Upper Freeport coal. In this study, we model these adsorption measurements with the Simplified Local Density (SLD) theory.

Careful analysis of gas adsorption behavior indicates that accounting for the high-density limiting behavior is necessary for the accurate modeling of high-pressure gas adsorption. Therefore, in implementing the SLD theory, we have developed a new equation of state (EOS), which utilizes an accurate hard-sphere (HS) repulsive term.

The SLD-HS model was used to represent the adsorption isotherms of the coals considered, where model parameters were regressed for each coal. On average, the model can represent the adsorption isotherms within their experimental uncertainties. Further, an analysis was conducted to delineate the effect of coal chemical composition on the adsorption behavior.