A New Simplified Local Density Model for Adsorption of Pure Gases and Binary Mixtures

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Adsorption modeling is an important tool for process simulation and design. Many theoretical models have been developed to describe adsorption data for pure and multi component gases. The simplified local density (SLD) approach is a thermodynamic model that can be used with any equation of state and offers some predictive capability with adjustable parameters for modeling of slit-shaped. Previous studies have referred the SLD model to Lennard- Jones potential function for fluid-solid interactions. In this paper we have focused on application of Sutherland potential function in SLD-Peng-Robbinson model instead of Lennard- Jones. The advantages and disadvantages of using the new potential function for adsorption of methane, ethane, carbon dioxide, nitrogen, and three binary mixtures on two types of activated carbon are illustrated. The results are compared with previous models and it is shown that the new SLD model can correlated adsorption data over different pressures and temperatures with minimum error.