261e Experimental Uncertainties of Volumetric Methods for Measuring Equilibrium Adsorption

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Knowledge of adsorption equilibrium is essential in many industrial processes, including the evolving technologies of fuel cells and CO2 sequestration. To develop reliable adsorption models requires a sound theoretical framework and accurate experimental data.

Experimental methods based on volumetric, gravimetric, and chromatographic techniques have been used to measure high-pressure gas adsorption. Currently, two volumetric methods are widely used to measure supercritical gas adsorption on heterogeneous matrices, such as activated carbon, coal, and zeolites. In this presentation, we discuss the details of the experimental designs and error analyses of the two volumetric techniques. Case studies, involving both pure-fluid and mixture adsorption measurements, are used to demonstrate the efficacy and pitfalls of the volumetric method. Further, these case studies highlight the differences in uncertainties associated with excess and absolute adsorption data.