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Adsorbed Hydrogen Film Densities and Thicknesses Determined from Low-Temperature Hydrogen Sorption Experiments[1] JACOB BURRESS, ELMAR DOHNKE, MATTHEW BECKNER, Physics Dept. U. of Missouri, MARK LEE, Chemistry Dept. U. of Missouri, CARLOS WEXLER, PETER PFEIFER, Physics Dept. U. of Missouri — Hydrogen storage through physisorption has shown tremendous promise. Advancement of our understanding about hydrogen behavior in confined pores can lead to a development of new storage materials. For example, isosteric heat is used to determine the quality of a sorbent. Yet, Clausius-Clapeyron isosteric heat calculations are typically performed on excess adsorption, which leads to unphysical results. Absolute adsorption should be used for these calculations. To determine absolute adsorption from excess adsorption, the volume of the adsorbed film is needed. We have built a Sievert type instrument capable of temperatures from 10 K to 300 K and pressures up to 200 bar. Using this instrument to measure low temperature (< 77 K) and high pressure (> 100 bar) isotherms, experimental film density and volume have been determined from the linear decrease in excess H_2 as a function of bulk gas density. Additionally, some materials have shown H_2 uptakes higher than what their surface area predicts. One hypothesis is N_2, the standard gas to determine surface areas, is sterically forbidden to go into pores that H_2 can. Sub-critical H_2 isotherms have been measured to determine surface area available to the H_2 and comparisons are made to N_2 surface area.

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