DISSOCIATIVE STORAGE OF HYDROGEN ON MODIFIED CARBON SURFACES

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Interest in the use of hydrogen as a fuel prompted investigations into the use of activated carbon as a means of storing hydrogen. At 298°K in low pressure investigations, type PCB activated carbon irreversibly adsorbed 1.3 wt-% atomic hydrogen in contrast to type BPL activated carbon which reversibly adsorbed 0.59 wt-% atomic hydrogen.

At high pressures molecular hydrogen was dissociated in situ using impregnants known to dissociatively adsorb hydrogen. Previous work by others has suggested that suitable impregnants should promote hydrogen atom spillover onto the carbon surface resulting in enhanced capacities similar to those found for atomic hydrogen at low pressures. Adsorption isotherms were determined for a series of impregnants on type BPL activated carbon over the temperature range 195-423°K. At 122 atmospheres pressure and 298°K, a maximum of 0.60 wt-% hydrogen was adsorbed on a Pd impregnated carbon. A second carbon impregnated with Pt was able to adsorb 0.58 wt-% hydrogen under similar conditions. At 195°K the Pd and Pt impregnated type BPL activated carbons adsorbed 1.08 and 1.10 wt-% hydrogen, respectively. A series of other impregnants were tested; however, all displayed lower capacities. The effects of pressure, temperature and impregnant were investigated and will be reported.