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Studies of Adsorption Characteristics of Activated Carbons down to 4.5 K using a Dynamic Adsorption Technique

Cryosorption pump is the only possible device to pump helium, hydrogen and its isotopes in a tokamak. Activated carbons are the most suitable adsorbents for the development of these pumps. For this purpose, the data of adsorption characteristics of activated carbons in the temperature range 4.5 K to 77 K are needed. This data is normally obtained with the help of a micro pore analyzer which uses a dosing routine for the adsorbate on an adsorbent maintained at the cryogenic temperature using a two stage GM cryocooler. At a given pressure of the adsorbent, small quantities of the adsorbate gas is dosed so that the sample pressure rises to the next set value. The instrument continuously monitors the gas quantity to estimate the total gas adsorbed by the sample at a given pressure.

Instead of the above, if the gas is continuously passed at an extremely slow rate, then the sample is nearly in steady state equilibrium with pressure. Here we present this dynamic adsorption technique, wherein the experimental setup is designed to allow the continuous flow of adsorbate into the adsorbent and one monitors the integral gas flow and the pressure of the adsorbent as a function of time. The above procedure is less time consuming and gives reasonably accurate results. The details of the experimental setup and the preliminary results on specific activated carbons at 77 K and ~30 K are presented here.

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