

Water Adsorption on Porous Carbons

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Adsorption isotherms of water on porous carbons exhibit very large hysteresis loops. It is now believed that the origin of the hysteresis in water adsorption is different from that of adsorption of simple gases in mesoporous solids, where the difference in the curvature of the interface separating the adsorbed phase and the gas phase is the principal reason for the hysteresis. In the invited presentation, we present the differences of water adsorption isotherms on graphitized carbon black (flat surface), micropores, and mesopores, and discuss in details the mechanisms of water adsorption in these materials by analyzing the descending scanning curves. In this presentation, we present the more details of the water adsorption mechanism with the behaviors of the water adsorption isotherms at different temperatures. From the detailed analysis of the isotherms, we propose a mechanism for water adsorption in porous carbons as a sequence of the following processes (see the schematic diagram in Fig. 1): (1) water molecules adsorbing on functional groups, (2) growth of water clusters around the functional groups with increasing pressure, and (3) bridging of adjacent clusters to form condensate which eventually fill the confined space, and the extent of this pore filling depends on the size of the confined space [1-6].

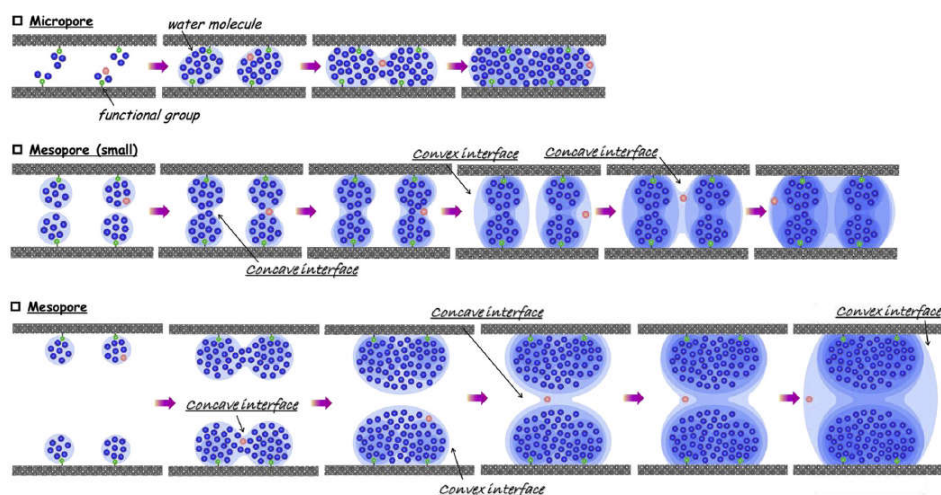


Fig. 1 Schematic diagram of the water clusters growing in different confined spaces from low pressure in micropores and mesopores.

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