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Adsorption of gases on peat soils: the role of energetic and geometric heterogeneity.

S. Sokolowski (1), Z. Sokolowska (2)

(1) Department for the Modelling of Physico-Chemical Processes, Maria Curie-Sklodowska University, 20031 Lublin, Poland, (2) Institute of Agrophysics, Polish Academy of Sciences, 20290 Lublin

We discuss how the effects of energetic and geometric heterogeneity of peat soils can be elucidated from gas adsorption data and from mercury intrusion measurements. The energetic heterogeneity is characterized by the adsorption energy distribution function, whereas the geometric heterogeneity - by the surface fractal dimension. Theoretical considerations are applied to the analysis of adsorption isotherms of nitrogen and water vapor on several peat soils. In addition to natural soil samples we also study samples thermally treated and chemically modified. Observing the changes in the surface fractal dimension with changes in the temperature of the thermal treatment, we have found that for the majority of the samples the fractal dimension decreases with the decrease of the temperature. Instantaneously, the specific surface area decreases too. This means that the surface roughness diminishes with the increasing temperature of the treatment in those cases. We have also found that the thermal treatment reduces the amount of low energetic centers and, in the case of several samples, leads to the formation of new centers, characterized by higher values of the adsorption energy.