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Adsorption and Desorption of Nitrogen and Water Vapor by clay

Deshan CUI, Qiong CHEN, Wei XIANG, and Wei HUANG
Faculty of Engineering, China University of Geosciences, Wuhan, China (cuideshan@cug.edu.cn)

Adsorption and desorption of nitrogen and water vapor by clay has a significant impact on unsaturated soil physical and mechanical properties. In order to study the adsorption and desorption characteristics of nitrogen and water vapor by montmorillonite, kaolin and sliding zone soils, the Autosorb-iQ specific surface area and pore size analyzer instrument of United State was taken to carry out the analysis test. The adsorption and desorption of nitrogen at 77K and water vapor at 293K on clay sample were conducted. The theories of BET, FHH and hydration energy were taken to calculate the specific surface, surface fractal dimension and adsorption energy. The results show that the calculated specific surface of water vapor by clay is bigger than nitrogen adsorption test because clay can adsorb more water vapor molecule than nitrogen. Smaller and polar water vapor molecule can access the micropore and then adsorb on the mineral surface and mineral intralayer, which make the mineral surface cations hydrate and the mineral surface smoother. Bigger and nonpolar nitrogen molecule can not enter into the micropore as water vapor molecule and has weak interaction with clay surface.