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미세한 다공성 재료에서의 물리적흡착과 화학적흡착

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Physisorption and Chemisorption on Microporous Materials

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Due to their high adsorption capacity, microporous carbonaceous materials are widely used as solid adsorbents in many fields of industrial applications. In this study Spherocharb and Sucrose Char, which are microporous carbonaceous materials, were prepared for samples. Molecules and atoms can stick to solid surfaces in two ways. In physisorption there is a van der Waals interaction which is a long-range but weak interaction. In chemisorption the molecules stick to the solid surface by forming a chemical bond. A volumetric adsorption apparatus, which was designed to measure the pressure, temperature, and gas sample volume before and after contact with the adsorbent, was used in order to collect physisorption data. While the TGA(Thermogravimetric analyzer), which was designed to give a direct plot of weight versus time or weight versus temperature at constant heating rate, was used in order to collect chemisorption data. It is known that physisorption occurs almost instantaneously: but chemisorption may take place slowly, since the activation energy for physisorption is lower than the activation energy of chemisorption.

Experimental data show that while chemisorption involves high heat of adsorption, physisorption involves low heat of adsorption. It is found that the activation energy of the oxygen chemisorption on Spherocharb is approximately six times greater than that of the nitrogen physisorption on Spherocharb.