Surface nonuniformity of microporous sorbents and their features in adsorptions of CO_2, CO, N_2, and H_2

조일흠, 김문현*, 박중호
대구대학교 환경공학과
(moonkim@daegu.ac.kr*)

Zeolites, activated carbons and metal-organic framework materials with different surface nonuniformity have been used to investigate its role in adsorptions of CO_2, CO, N_2, and H_2. The indicated adsorption isotherms and uptakes of the adsorbates strongly depended on themselves as well as on the adsorbents, because of significant differences in electronic properties between the adsorbates and in surface energetic heterogeneity of the adsorbents. The selectivity of CO_2 to other gases, and the isosteric heat of CO_2 adsorption were also a strong function of the adsorbents due to their difference in such properties. Adsorbents with energetically-heterogeneous surfaces, such as zeolites, gave higher CO_2 uptakes at low pressures less than ca. 2 bar; however, as equilibrated adsorption pressure increases, such a surface nonuniformity was minor and the micropore volume and surface area of adsorbents could be more dominant in the effect on adsorption performances. All these results were very consistent with the isosteric heat of CO_2 adsorption on the sorbents studied.