

عنوان مقاله:

Predictions of the adsorption equilibrium of CO₂/O₂ mixture on multi-walled carbon nanotube using ideal adsorbed solution theory

محل انتشار:

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خلاصه مقاله:

Multiwalled carbon nanotubes (MWCNT) were found to be an effective separation media for purifying CO₂ from O₂. Significant uptakes of CO₂ and O₂ were measured at 288 K, 298K and 308 K over the pressure range of 1 to 40 bar using volumetric method in dual sorption vessels. The same shape of isotherms introduced a common mechanism of adsorption but the amount of CO₂ adsorbed on MWCNT is 2 times higher than O₂ adsorption. The mass uptake of CO₂ and O₂ by MWCNT was found to increase with increasing pressure and decreasing temperature. The experimental data was well fitted by the Langmuir and Freundlich model isotherms considering the values of regression correlation coefficients. Following a simple acidic treatment procedure, CO₂ and O₂ adsorption was increased over range of pressure. The adsorbents was characterized by N₂ adsorption isotherm at 77 K, Fourier transform infrared spectroscopy (FTIR), transmission electron microscopy (TEM), scanning electron microscopy (SEM) and thermogravimetric analysis (TGA). The effect of temperature and pressure on selectivity obtained from IAST demonstrated that maximum selectivity over the pressure and temperature ranges $p = 0.5-5$ bar and $T = 298-308$ K was achieved at 308 K and 5 bar.

کلمات کلیدی:

Adsorption isotherms; Carbon dioxide; IAST; MWCNT; Oxygen

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