

Study on ethylene adsorption characteristics by newly prepared adsorbent

손의락, 한상섭*, 범희태, 박종호, 김종남, 이태종¹, 조순행
한국에너지기술연구원; ¹경북대학교
(sshan@kier.re.kr*)

Ethylene is one of the basic starting materials in petrochemical industries. The separation of ethylene from ethane has been operated by energy intensive distillation. To produce high concentration of ethylene, new adsorbents were synthesized by incipient wetness method of Ag⁺. Cahn balance was used to measure pure isotherms of C₂H₆ and C₂H₄ and volumetric apparatus was used to measure C₂H₄-C₂H₆ binary isotherms. Adsorption isotherms of pure gases were measured at 298.15K, 323.15K and 353.15K, pressure ranges are from 0 to 5100mmHg. Pure ethane isotherm showed good agreement with Langmuir isotherm and pure ethylene isotherm showed good agreement with Langmuir+Freundlich and Langmuir+Unilan isotherms which were derived from considering physical site and chemical site. The decrease in isosteric heats of adsorption of ethylene with increasing the coverage was observed and the same result in case of ethane. Langmuir+Freundlich, Toth adsorption isotherm and ideal adsorbed solution(IAS) model were used to calculate isosteric heats of adsorption, binary isotherms. Experimental breakthrough results showed the possibility of ethylene purification from C₂ mixture.