

Adsorption equilibrium and kinetics of nitrous oxide, oxygen and nitrogen on various adsorbents

박두용, 김정훈¹, 안형웅², 이창하[†]

연세대학교; ¹한국화학연구원; ²에딘버러대학교

(leech@yonsei.ac.kr[†])

Adipic acid is one of the essential materials to manufacture synthetic fibers like nylon-6/6. The effluent gas of adipic acid production mainly consists of N₂O, O₂, N₂, CO₂, and H₂O. A significant amount of N₂O is emitted from the process, and N₂O is one of the representative non-CO₂ greenhouse gases, it should be recovered from the effluent gases for the mitigation of global climate change. The recovered N₂O can be widely applied to many industrial areas such as medicine, semiconductor, and optics. In this study, to select an appropriate adsorbent for equilibrium separation and kinetic separation, adsorption isotherms of N₂O, O₂ and N₂ are measured on carbon type and silica type adsorbents by a volumetric method. Adsorbents for equilibrium separation are evaluated considering adsorption amount and affinity, and adsorbents for kinetic separation are evaluated considering the difference in adsorption rate. The adsorption uptake curves are derived from non-isothermal model and isothermal dual resistance model. The models applied to each system consider the adsorption characteristics.