

Comparison of adsorption mechanism of N₂O on silica, activated carbon, and carbon molecular sieve

박두용, 이창하†

연세대학교

(leech@yonsei.ac.kr†)

Nitrous oxide (N₂O) is one of the representative non-CO₂ greenhouse gases and the 100-year time horizon global warming potentials of N₂O was as defined by the IPCC fifth assessment report. A large amount of N₂O is emitted from the adipic acid process. It should be removed from the effluent gases for the mitigation of global climate change. In industrial fields, nitrous oxide generally decomposes in the thermal reduction unit to nitrogen and oxygen. It is a huge benefit from environmental and industrial views to develop a process of N₂O recovery.

In this study, adsorption isotherms of N₂O are measured by a volumetric method to evaluate the appropriate adsorbents for equilibrium separation and kinetic separation on silica type and carbon type adsorbents. The adsorbents are evaluated considering the difference in adsorption rate because of the different dominant diffusion mechanisms. The theoretical adsorption uptake curves fitted from the experimental uptake curves are derived from the non-isothermal model and the isothermal dual resistance model.