

Adsorption equilibrium of adipic acid production off gases on zeolite 13X

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Recently, non-CO₂ greenhouse gas (GHG) reduction is considered important as well as CO₂ reduction under United Nations Framework Convention on Climate Change (UNFCCC). A lot of N₂O one of the representative GHGs is emitted from adipic acid production. The global warming potential (GWP) of nitrous oxide (N₂O) is almost 300 times rather than GWP of carbon dioxide.

However, there are many industrial applications of N₂O such as medicine (anesthetic, analgesic), oxidizer (rocket, combustion engine) and aerosol propellant. Especially, high-purity N₂O (99.999%) is used for deposition of an insulating oxide film in the chemical vapor deposition (CVD) process in semiconductor industry. Therefore, the recovery of N₂O is both important in environmental and industrial aspects.

In this study, the adsorption equilibrium of adipic acid production off gases (N₂O, O₂ and N₂) was measured on zeolite 13X. The experiment was performed on volumetric apparatus at 293.15, 308.15 and 323.15K and up to 1.0 MPa. The results could contribute to designing adsorption processes using zeolite 13X for non-CO₂ GHG reduction and N₂O utilization from adipic acid production off gases.