

CO₂ capture on NiO supported imidazolium-based ionic liquid

ABSTRACT

CO₂ capture on NiO supported imidazolium-based ionic liquid, NiO/[emim][HSO₄]/SiO₂ as an adsorbent was investigated using gas adsorption analyzer and physicochemical properties of the adsorbent were characterized using X-ray powder diffraction (XRD), surface area analyzer (BET method) and temperature-program-desorption analysis (TPD). Immobilization of ionic liquid on silica, [emim][HSO₄]/SiO₂ slightly decreased the surface area compared to bare silica from 266 to 256 m²/g due to the pore blocking by the confinement of IL in SiO₂ pore. Interestingly, introduction of NiO on supported ionic liquid, NiO/[emim][HSO₄]/SiO₂ was increased the surface area as well as pore volume from 256 to 356 m²/g and 0.14 to 0.38 cm³/g, respectively. The enhancement of surface area and pore volume was significantly increased the CO₂ adsorption performance with capacity of 48.8 mg CO₂/g adsorbent compared to [emim][HSO₄]/SiO₂ 27.3 mg CO₂/g adsorbent).

Keyword: Adsorption; CO₂ capture; Desorption; Ionic liquid; Nickel oxide