

Preparation of CO₂ adsorbent with N¹-(3-(trimethoxysilyl)propyl)-1,3-propanediamine and its performance

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N¹-(3-(trimethoxysilyl)propyl)-1,3-propanediamine (2NS-P), a diaminosilane having a propyl spacer in between the two amino groups was successfully synthesized, and a CO₂ adsorbent functionalized with 2NS-P was prepared via impregnation of it into silica. The adsorption performance and stability of 2NS-P/Kona95 were examined and compared to that of N¹-(3-(trimethoxysilyl)propyl)ethane-1,2-diamine (2NS)/Kona95 having an ethyl spacer. 2NS-P/Kona95 exhibited better CO₂ adsorption capacity and CO₂/N efficiency. The adsorbents were subjected to 10 cycles of temperature swing adsorption (TSA), demonstrating that stability of 2NS-P/Kona95 was better than that of 2NS/Kona95. The spent 2NS-P/Kona95 showed the absence of cyclic urea formation from FT-IR spectra, explaining the better stability of 2NS-P/Kona95 than 2NS/Kona95.