

The study on TEPA-AN structures on CO₂ adsorption/desorption behavior in fixed bed column

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Adsorption CO₂ characteristics depend on the type of amines. In general, the order of reactivity of amines type with CO₂ is primary > secondary > tertiary. However, due to the high affinity of CO₂, primary amines need large desorption energy to remove CO₂. Tetraethylenepentamine(TEPA) which contains on average three secondary amines sites per molecule was used for CO₂ Chemisorption. To increase working capacity of TEPA molecules, We tried to modify the TEPA with acrylonitrile to substitute primary amine to secondary amine. PMMA were used as support to confirm CO₂ adsorption/desorption behavior and working capacity of sorbents. Fixed bed experiments were conducted with 4 cycle test, which operation conditions were adsorption at 75 °C (15% CO₂, N₂ balance) and desorption at 120 °C (90% CO₂, N₂ balance), respectively. The adsorption capacity was reduced compared to non modified TEPA impregnated sorbent (STEPA), but modified TEPA impregnated sorbent (ST3AN) showed higher thermal stability during cyclic test. Especially, the rate of adsorption/desorption of ST3AN was greatly improved prior ID STEPA.