

Energy Performance Evaluation of Eight Solid Sorbents for CO₂ Capture in Heat-integrated Moving Bed Processes under TSA and VTSA Operations

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In the solid sorbent CO₂ capture process, CO₂ regeneration is ordinarily done at high temperature with or without vacuum. The strategy and specific conditions for CO₂ regeneration are determined from the economy point of view and depend entirely on the characteristics of the sorbent. Optimum CO₂ regeneration strategy was studied for eight adsorbents consisting of three physical adsorbents, zeolite 13X, zeolite 5A, and zeolite 13X-APG, and five chemical adsorbents, PE-MCM-41-PEI, TA-MSU, AEAPS-MSU, RITE, and 0.37EB-PEI, by evaluating the energy performance in the heat-integrated moving bed process. Through this investigation, a general criterion to decide which of the TSA (temperature swing adsorption) and VTSA (vacuum temperature swing adsorption) methods is more energy efficient based on isotherm information and energy models was also be developed.