

A study for high-purity hydrogen production on Ni-Ca-based catal-sorbents in sorption enhanced methane reforming reaction

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A study for pure H₂ production through the CO₂ capture in sorption enhanced steam methane reforming (SESMR) has been investigated. The best efficiencies were obtained using CaO due to its more favourable thermodynamics and high reaction rates. In this study, The Ni-Ca-based catal-sorbents were prepared with various CaO precursors such as calcium carbonate (NA50Ca-C), calcium hydroxide (NA50Ca-H), calcium acetate (NA50Ca-A) and calcium oxide (NA50Ca-N) by the physical mixing method at 850°C. The Ni-Ca-based catal-sorbents were carried out in a fixed-bed reactor at 600 °C, S/C = 3. The NA50Ca-N catal-sorbent showed the higher H₂ yield and methane conversion than the other catal-sorbents. These results were related to pore size, pore volume, crystal structure and dispersion of Ni active sites of Ni-Ca-based catal-sorbents.