

Synthesis, Characterization, and Activity Pattern of Ni–Al Hydrotalcite Catalysts in CO₂ Methanation

Authors

Salvatore Abate, Katia Barbera, Emanuele Giglio, Fabio Deorsola, Samir Bensaid, Siglinda Perathoner, Raffaele Pirone, Gabriele Centi

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Description

Two nickel–aluminum hydrotalcite samples (HTLCs) were prepared by a coprecipitation method at different pH values and investigated as catalysts for the hydrogenation of carbon dioxide. The newly synthesized samples have been compared with a reference alumina supported nickel-based commercial catalyst, with equal nickel content. The as-prepared and commercial samples were characterized by BET analysis, atomic adsorption spectroscopy (AAS), X-ray diffraction (XRD), and temperature-programmed techniques (H₂-TPR and CO-TPD). Catalytic activity of the analyzed samples was investigated toward hydrogenation of CO₂ at atmospheric pressure by varying reaction temperature between 250 and 400 °C. The maximum CO₂-to-CH₄ conversion value achieved by hydrotalcite was ≈86% at 300 °C. The superior performance of HTLCs has been put in relationship with the major catalysts reducibility ...