

Catalytic Performance of γ -Al₂O₃-ZrO₂-TiO₂-CeO₂ Composite Oxide Supported Ni-Based Catalysts for CO₂ Methanation

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Description

Composite oxide supported Ni-based catalysts were prepared by a wet impregnation technique and applied to the methanation of carbon dioxide. The composite oxide supports were prepared by an impregnation-precipitation method using commercial γ -Al₂O₃ powder as a host with variation of the percentage of loading of ZrO₂, TiO₂, and CeO₂ promoters from their respective salt precursors. NH₄OH was used as the precipitating agent. The as-prepared catalysts were characterized by Brunauer-Emmet-Teller surface area analysis, atomic absorption spectroscopy, X-ray diffraction, temperature-programmed reduction by H₂ (H₂-TPR), and CO chemisorption. Catalytic activity of the newly synthesized catalysts was investigated toward hydrogenation of CO₂ at atmospheric pressure by varying reaction temperature between 250 and 400 °C (with increasing step equal to 25 °C). Experimental results revealed that the ...