

## Synthesis and characterization of palladium catalysts supported on $\delta$ -Al<sub>2</sub>O<sub>3</sub>/Ni composite

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### Abstract

© Pleiades Publishing, Ltd., 2015. Abstract The effect of the morphological, textural, and acid characteristics of a support prepared from a composite of alumina and a nickel-containing highly porous permeable cellular material (HPCM) on the electronic and geometric properties of supported palladium particles and their activity in the selective hydrogenation of acetylene is studied. It is found that a  $\delta$ -Al<sub>2</sub>O<sub>3</sub>/Ni-HPCM support ensures the formation of a more uniform charge state distribution of the active component in comparison with the conventional catalysts supported on pure  $\delta$ -Al<sub>2</sub>O<sub>3</sub>, i.e., palladium particles with surface atoms that have a higher electron density on the valence orbitals. This state of the active component is responsible for the high selectivity of the hydrogenation of acetylene to ethylene in the ethane-ethylene fraction when using a Pd/ $\delta$ -Al<sub>2</sub>O<sub>3</sub>/Ni-HPCM catalyst; this selectivity is 78.3%, which is 35.7% higher than that of the process using a catalyst based on conventional  $\delta$ -Al<sub>2</sub>O<sub>3</sub>.

<http://dx.doi.org/10.1134/S2070050415010079>

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### Keywords

nickel-containing highly porous permeable cellular material, palladium acetylacetonate, Pd/ $\delta$ -Al<sub>2</sub>O<sub>3</sub>, Pd/ $\delta$ -Al<sub>2</sub>O<sub>3</sub>/Ni, selective hydrogenation of acetylene