



THE INFLUENCE OF THE MODIFYING BY INDIUM OXIDE ON THE SURFACE PROPERTIES OF ZIRCONIA CATALYSTS

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Zirconium dioxide shows catalytic activity in hydrogenation of 1,3-butadiene by molecular hydrogen and hydrogen donor molecules, cleavage of C-H bonds, selective reduction of nitrogen oxides with hydrocarbons, and high selectivity for the formation of 1-olefins from secondary alcohols; isobutane from CO+H₂. Zirconium dioxide is widely used as a base for supported catalysts. Its original surface properties makes it possible to create new generation of more active supported catalysts, that have better catalytic performance than those supported on silica or alumina.

The catalytic activity of ZrO₂ depends on both its crystal lattice structure and acid - base surface properties. The hydrothermal method is a very useful for preparing nanosized zirconia powders. It is possible to obtain new properties of ZrO₂ surface by modifying with indium oxide. The effect of In³⁺ ion on the formation of zirconia under hydrothermal condition were investigated in this paper.

The samples were obtained from the solution of the mixture of Zr and In nitrates by decomposition in supercritical water or by co-precipitation method followed by hydrothermal treatment of sediment. The characterization of these samples was carried out by BET, XRD, Raman and IR Diffuse Reflectance Spectroscopy. Surface acidic properties of complex oxide In₂O₃-ZrO₂ after vacuum pre-treatment at 400 - 600°C were investigated by infrared spectroscopy with carbon monoxide as a probe.

A mixture of monoclinic and tetragonal ZrO₂ was the product of hydrothermal reaction in both synthesis methods. The surface structure of samples obtained in supercritical water is more stable, in comparison with samples obtained by hydrothermal pre-treatment of sediment samples.

The nature of surface hydroxyl groups and the value of Lewis acidity of modified samples and pure ZrO₂ are similar. The basicity of a surface of nanosized complex oxides In₂O₃-ZrO₂ grows with an increase of In₂O₃ concentration.

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