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CATALYTIC ACTIVITY OF THE MODIFIED ACTIVATED CARBON IN THE DEHYDRATION OF SIMPLE SATURATED ALCOHOLS

Modification of activated carbon was carried out and catalysts with strong acidic groups on the carbon surface were obtained. By means of chemical analysis method and and thermographic analysis with IR registration of desorption products method concentration of acid groups of the samples was determined and their thermodesorption proprties were investigated. Their catalytic properties in methanol and ethanol dehydration were studied. It is shown that catalytic activity of the obtained samples in the dehydration reactions is determined by the concentration and thermal stability of acidic groups on the surface. The most stable under conditions of dehydration are the samples containing phosphotungstic acid and sulfopolystyrene. Preliminary oxidative treatment of activated carbon in case of supported sulfuric acid resulted in increase in catalytic activity while using these samples in both reactions. For activated carbon modified with phosphotungstic acid preliminary oxidation leads to a decrease in activity in ethanol and methanol dehydration while using samples pre-oxidized with hydrogen peroxide and to increase in activity for the samples pre-oxidized with nitric acid. A comparative analysis of the catalytic activity of modified samples in the reaction of ethanol and methanol dehydration compared to their activity in isopropyl alcohol dehydration was conducted. It was established that since dehydration reaction of methyl and ethyl alcohols proceeds at higher temperatures than the reaction of dehydration of isopropyl alcohol, the deactivation of the samples and reducing their catalytic activity during the repeated use under the influence of the reaction medium and higher temperatures occurred. The most rapidly lose their activity the samples modified with sulfuric acid, while the activity of the samples, modified with phosphotungstic acid and sulfopolystyrene decreases less significantly. The sample obtained by treatment with sulfur vapors with subsequent oxidation with hydrogen peroxide in terms of activity loss occupies an intermediate position.

Keywords: activated carbon, surface modification, sulfonation, alcohols dehydration.