The Deactivation of Polyoxide Catalysts and Their Regeneration

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Abstract—The mechanism of adsorption of SO_2 as a component of discharge in the air on Pt- and Pd-containing catalysts has been studied. The conditions of their poisoning and regeneration have been defined. Methods of TPD, IRS, mass-spectrometry, and chromatography were applied for this research. The study of SO_2 adsorption and its interaction with oxygen on Pt(Pd)/Al_2O_3 catalysts at the temperature range of 300–500°C has shown that the formation of the molecular-adsorbed forms of SO_2 (I and II) and tightly covalently bound sulfate (III form) and ionic sulfate (form IV), responsible for the catalysts' poisoning occurs. Decrease of the Pt (Pd)-containing catalysts' poisoning was put into effect by their modification with the group of transition elements consisting of Co, Cr, and Ce. The regeneration of the catalysts was carried out by a heat treatment of samples at 700°C and above. The opportunity is shown for 99–100% Pt and Pd extraction out of the dead catalysts and the recycled Al_2O_3 carrier.

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