Vapor-Phase Oxidation of β-Picoline to Nicotinic Acid on V_2O_5 and Modified Vanadium Oxide Catalysts

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Abstract—Modification of V_2O_5 with Ti, Sn, Zr, Nb, and Al oxides improves the activity and selectivity of the vanadium oxide catalyst in vapor-phase oxidation of β-picoline to give nicotinic acid. It is shown that the conversion of β-picoline and the yield of nicotinic acid on two-component V_2O_5–TiO_2, V_2O_5–SnO_2, V_2O_5–$ZtrO_2$, V_2O_5–Nb_2O_5, and V_2O_5–Al_2O_3 catalysts may be several times those on the V_2O_5 catalyst. It was found that, on passing from V_2O_5 to double-component vanadium-containing catalysts, the proton affinity of active oxygen bonded to vanadium, calculated by the quantum-chemical method, grows simultaneously with the increase in the activity of the catalysts in the oxidation reaction.

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