

Influence of Bi–Fe additive on properties of vanadium phosphate catalysts for n-butane oxidation to maleic anhydride

Abstract

The physico-chemical and catalytic properties of three ways of modified catalysts were studied, i.e. (i) the addition of both Bi and Fe (nitrate form) during the refluxing $\text{VOPO}_4 \cdot 2\text{H}_2\text{O}$ with isobutanol (Catalyst A), (ii) the simultaneous addition of BiFe oxide powder in the course of the synthesis of precursor $\text{VOHPO}_4 \cdot 0.5\text{H}_2\text{O}$ (Catalyst B) and (iii) the mechanochemical treatment of precursor $\text{VOHPO}_4 \cdot 0.5\text{H}_2\text{O}$ and BiFe oxide in ethanol (Catalyst C). It was found that surface area of the modified catalysts has increased except Catalyst B. The reactivity of the oxygen species linked to V^{5+} and V^{4+} was studied by using H_2 -TPR, which also affected the catalytic performance of the catalyst. The conversion of n-butane decreases with an increment of oxygen species associated with V^{5+} .

Keyword: Vanadium phosphate, n-Butane, Oxidation, Oxygen species, Maleic anhydride