462d Comparison of Hydrothermal Four Component Movnbte Catalyst for Propane Oxidation and Ammoxidation

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The lower cost of alkanes as compared to olefins has in recent years spurred interest in replacing the olefin feed stocks using the corresponding alkane for all industrial purposes. So far, only one reaction has been implemented on a large scale industrially: the replacement of butene by n-butane for the oxidation reaction to maleic anhydride. This was accomplished using Vanadium Phosphorous Oxide catalysts. The oxidation / ammoxidation of propane to acrylic acid/acrylonitrile is a close second in this process and investigations are currently ongoing on pilot scale projects. The four component Mo-V-Nb-Te oxide catalyst prepared by the hydrothermal method has so far been proven to yield the best results for both propane oxidation and ammoxidation. Yields exceeding 40% and 60% have been reported using this oxide system for oxidation and ammoxidation reactions, respectively. The optimum yield to acrylic acid and acrylonitrile were obtained at 360 deg.C and 380°C, respectively, in accordance with the higher activation energy needed for propane ammoxidation as compared with oxidation. In this paper, we present a comparison of the catalyst for the propane oxidation reaction versus the ammoxidation reaction across a range of conversions.

The effects of using different purity levels of nitrogen during the final step of catalyst preparation, i.e. calcination was also found to have a profound effect on the kinetic performance of the catalyst for both the reactions. Here we shall also present our recent findings and comparisons of the performance of this catalyst system when calcined using different levels of oxygen.