

Vanadium oxides for selective oxidation catalysis: The need for structural in-situ studies

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Abstract:

Vanadium is an essential ingredient in most oxidic selective oxidation processes to generate functionalised medium-sized alkanes. The archetype catalysis is VPO (vanadyl pyrophosphate) for butane oxidation and Mo-V-W mixed oxide (MMO) for acrolein oxidation. Both catalysts are metastable systems undergoing several phase transitions from their as-prepared form into the active phase. The understanding of these transformations is vital for defining suitable reference materials for fundamental studies by surface science. The knowledge about structural dynamics allows further to improve the heuristic ideas of the mode of operation of such catalysts according to the Mars-van-Kreveln paradigm. Deeper understanding of the working principles of such catalysts ultimately leads to rational and chemically improved versions of these catalyst systems accounting for over 20% of the chemical industry's economical turnover.

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