



Oxovanadium catalyst based on nano-porous carbon xerogel: an efficient heterogeneous nano-catalyst for aerobic oxidation of olefins

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ABSTRACT

Porous carbon xerogels were prepared from the sol-gel polymerization of resorcinol with formaldehyde (RF) followed by carbonization at a high temperature under argon atmosphere. The capacity of the carbon xerogels for direct immobilization of metal complexes was tested with a vanadium(IV) complex, $[V^{IV}O(HL)(H_2O)(CH_3OH)]$, which possesses an extended ligand π system and reactive hydroxyl groups on the *L*-tyrosine fragment. Textural characterization of the CXG and CXG/ $[V^{IV}O(HL)(H_2O)(CH_3OH)]$ have been investigated using N_2 adsorption-desorption at $-196^\circ C$. Chemical surface groups were analyzed by FT-IR spectroscopy. Nano-particle size and morphology of CXG and CXG/ $[V^{IV}O(HL)(H_2O)(CH_3OH)]$ nano-particles have been characterized by scanning electron microscopy (SEM). Catalytic activity of CXG/ $[VO(HL)(H_2O)(CH_3OH)]$ was investigated in the aerobic oxidation of olefins. The reaction conditions have been optimized for solvent and temperature. CXG/ $[VO(HL)(H_2O)(CH_3OH)]$ showed higher catalytic activity for the epoxidation of unfunctionalized olefins with molecular oxygen in the presence of isobutyraldehyde. Comparison of the heterogenized catalyst, CXG/ $[VO(HL)(H_2O)(CH_3OH)]$, with the corresponding homogeneous catalyst, $[VO(HL)(H_2O)(CH_3OH)]$, showed that the heterogeneous catalyst had higher activity and selectivity than the homogeneous counterpart. The heterogeneous catalyst was easily recovered from the reaction medium and could be re-used for other five runs without significant loss of activity.

Keywords: Xerogel; Aerobic oxidation; Oxovanadium; Nano-porous; Nano-particles

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