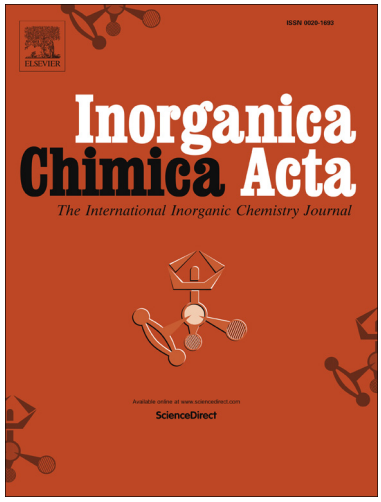

Vanadium complexes supported on organic polymers as sustainable systems for catalytic oxidations

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Vanadium complexes supported on organic polymers as sustainable systems for catalytic oxidations

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Abstract

Homogeneous catalysts have widespread technological application. However, due to advantageous features of immobilization of homogeneous catalysts on solid supports over their soluble counterparts, particularly their easy separation from the reaction mixture and their recycle ability, such systems have grown rapidly over the past few years. Amongst transition-metal compounds, vanadium-based complexes are often good catalysts for oxidation of organic compounds, e.g. by using H_2O_2 as primary oxidant, and have been successfully applied to a great variety of substrates. This work revises and discusses the performance of the various vanadium-based systems immobilized on polymeric supports developed since ca. 2011, with enhanced focus on applications for asymmetric synthesis. Several strategies are used to prepare immobilized vanadium-based complexes to be used as catalysts. The usual starting point is typically the selection of a homogeneous catalyst i.e. a vanadium complex that has been demonstrated to be highly active and/or highly selective. The additional constraints of the immobilized catalysts sometimes result in more effective catalysts with high turn over numbers which offer real prospect for technological developments. [1]

Keywords: Vanadium compounds; Polymer-supported vanadium complexes, Organic polymeric supports, Catalytic oxidations, Organic transformations, Asymmetric synthesis.

[1] PS - polystyrene cross-linked with divinyl benzene; PS-CH_2-Cl - chloromethylated PS; PS-im - imidazolomethylpolystyrene; PEG - polyethyleneglycol; acac - acetylacetonato; PMA_n - cross linked polyacrylate polymers; c-PMA_n-V - polymer anchored vanadium compounds on cross linked polyacrylate polymers; TBHP - *t*-butyl hydroperoxide; PSS - poly(sodium-4-styrenesulfonate); PSSM - poly(sodium-styrenesulfonate-*co*-maleate); PDMS - poly(dimethylsiloxane); Hpz - pyrazole; EGDMA - ethylene glycol dimethacrylate; AIBN – azobisisobutyronitrile; p(ST-*co*-VPIM) - copolymer of styrene and 2-(2'-hydroxy-4'-ethenylphenyl)imidazole; HDS - hydrodesulfurization; ODS - oxidative desulfurization; LDHs - brucite-like layers of layered double hydroxides; ee - enantiomeric excess.