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# Investigation of the substituent effects on the oxidation of styrene derivatives by silica-supported heterogeneous oxidovanadium(V) coordination compound

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Streszczenie

Vanadium coordination compounds, $[VO_2L]\cdot(CH_3OH)$ (**1a** and **1b**), were prepared from the reaction of tridentate hydrazone ligand, [HL=(*E*)-4-amino-N′-(1-(pyridin-2-ylethylidene)benzohydrazide] with $NH_4VO_3$ and $V_2O_5$, respectively. These compounds were characterized by various analytical methods, and the structures of **1a** and **1b** were determined by single crystal X-ray analysis which indicated that they have the same composition but crystallized in different unit cells and can be considered as polymorphs. The silica-supported catalyst (**Si-$VO_2$L**) was obtained by immobilization of **1** on the surface of silica using propionyl chloride-functionalized silica gel. **Si-$VO_2$L** was characterized by thermal gravimetric analysis (TGA), energy-dispersive X-ray spectroscopy (EDX), Fourier-transform infrared (FT-IR) spectroscopy, diffuse-reflectance spectroscopy (DRS), X-ray photoelectron spectroscopy (XPS), scanning electron microscopy (SEM), and X-ray diffraction analysis (XRD) and was employed as heterogeneous catalyst in the oxidation of styrene derivatives, and aqueous $H_2O_2$ was used as the green oxidant. **Si-$VO_2$L** was recovered several times, and characterized by various analytical methods. The results indicated its high stability. The effects of parameters such as temperature, the ratio of reagents, and nature of solvent on selectivity and activity of **Si-$VO_2$L** were investigated. The results indicated that both of the steric and electronic effects of the substituents on the phenyl ring of styrene can affect the selectivity and activity of the products. Electron withdrawing groups decrease the activity of the substrate and electron donating groups increase the activity.

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