

Selective oxidation of benzyl alcohols by silica-supported heterogeneous catalyst containing dioxidotungsten(VI) core

Autorzy

Neda Heydari

Rahman Bikas

Maryam Shaterian

Tadeusz Lis

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Streszczenie

A dioxidotungsten(VI) complex, $[\text{WO}_2\text{L}(\text{CH}_3\text{OH})]\cdot 0.5(\text{CH}_3\text{OH})$ (**1**), was prepared by the reaction of WC_6 and tridentate ONO-donor Schiff base ligand (**H₂L**) that was obtained from the reaction of 2-hydroxy-1-naphthaldehyde with 4-aminobenzoic hydrazide. Both **H₂L** and **1** were characterized by various analyses including nuclear magnetic resonance (NMR), Fourier transform infrared spectroscopy (FT-IR) and UV-Vis spectroscopy, and elemental analysis. Single crystal X-ray analysis was used to determine the crystal structure of the complex, which revealed that there is a free $-\text{NH}_2$ group in its structure. Therefore, the heterogeneous catalyst was obtained by supporting of **1** on propionyl chloride-functionalized silica gel. The synthesized supported catalyst (**Si-W**) was characterized by diffuse reflectance spectroscopy (DRS), thermogravimetric analysis (TGA), FT-IR, scanning electron microscope (SEM), X-ray photoelectron spectroscopy (XPS), energy-dispersive spectroscopy (EDS), and X-ray powder diffraction (XRD) analyses. The heterogeneous catalyst (**Si-W**) was utilized in the oxidation of benzyl alcohol derivatives with H_2O_2 under reflux condition at air atmosphere. The effects of the concentration of oxidant, temperature, and the nature of solvent on catalytic performance of the resulting compound were investigated and the results indicated that they have considerable effect on the activity and selectivity of **Si-W**. The heterogeneous catalyst was recovered several times and reused for oxidation reaction. The results of various analyses including FT-IR spectroscopy, SEM, TGA, EDS, and XRD indicated that there are no considerable differences between recovered catalyst and the fresh one. The results show that the synthesized silica supported dioxidotungsten(VI) complex is active and stable catalyst for oxidation of benzylic alcohols and its selectivity depends on the reaction condition.

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