AEROBIC OXIDATION OF ALCOHOLS TO KETONES IN POLY(ETHYLENE GLYCOL)/CO_2

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Selective oxidation of alcohols into carbonyl compounds is of great importance, and this has been an interesting topic for many years. However, exploring cleaner, cheaper, and recyclable catalytic systems for the aerobic oxidation of alcohols is still desirable. Cobalt species have been extensively studied as catalysts for a wide range of oxidation reactions. Abundant and cheap molecular oxygen is an attractive oxidant for oxidative reactions due to their obvious economic and ecological advantages, and it has been used in oxidation of alcohols with transition metals as catalysts. Oxidation of alcohols catalyzed by cobalt species is usually carried out in volatile organic solvents (VOS) or sometimes in acid/base media.

Increasing attention has been paid to the reactions in green solvents. Supercritical (SC) CO_2, poly(ethylene glycol)(PEG), and PEG/CO_2 biphasic system are attractive green solvents. Combination of cheap cobalt salts with green solvents and O_2 oxidant is promising for oxidation reactions. In this work, the aerobic oxidation of alcohols to corresponding ketones was carried out in PEG-600/SC CO_2 biphasic system using unsupported and supported $CoCl_2 \cdot 6H_2O$ as the catalysts. It was demonstrated that $CoCl_2 \cdot 6H_2O$, Co(II)/Al_2O_3, and Co(II)/ZnO were all active and selective for the reactions. Co(II)/ZnO was most stable and could be reused four times without considerable reduction of activity. The effect of CO_2 pressure, reaction time and solvent was investigated.

Acknowledgement We are very grateful to Ministry of Science and Technology of China (2006CB202504) for the finical support.