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Catalytic oxidation of alcohols by new Fe(III) oxazolidine complex

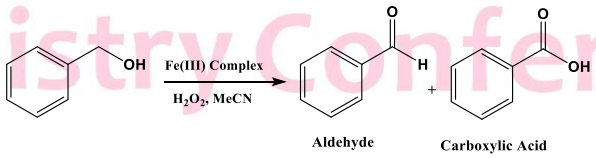
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Iron complexes are known as one of the attractive catalysts for many chemical reactions [1]. The exceptional catalytic properties of iron complexes is mainly related to its several oxidation states which can act as active intermediate in the oxygen transfer reactions and redox prcoesses [2]. Selective oxidation of alcohols to aldehydes or carboxylic acids is one of the crucial classes of organic reactions, and iron complexes can act as effective catalysts for this process [3]. In this context, a new dinuclear iron complex, $[Fe(\mu\text{-}L)(NCS)_2]_2$ (where HL is (4-ethyl-2-methyl-2-(pyridin-2-yl)oxazolidin-4-yl)methanol), was synthesized by the reaction of $Fe(NO_3)_3.9H_2O$, HL and KSCN in methanol. The complex has been characterized by using spectroscopic methods and elemental analysis. The crystal structure of the synthesized iron complex has been determined by single-crystal X-ray diffraction analysis which revealed it is alkoxido bridged dinuclear iron complex and the SCN ligands act as teminal monodentate ligand. The catalytic activity of this complex in the oxidation of benzyl alcohol derivatives to their corresponding benzaldehyde and benzoic acid derivatives has been studied in the presence of H_2O_2 as the green oxidant. In this study, the effects of several parameters such as the molar ratio of oxidant to product, temperature, and solvent on the reaction conditions have been investigated to find the optimal conditions for the selective oxidation of alcholos. Additionally, the effect of different substituents on the phenyl group of benzyl alcohol derivatives in this catalytic system has been examined. The results show that the selectivity and activity of this dinuclear Fe(III) complex depend on the steric and electronic properties of chemical substances and reaction conditions.



Keywords: Complex, Catalyst, oxidation, Iron

References

[1] B. Das, M.J. Baruah, M. Sharma, B. Sarma, G.V. Karunakar, L. Satyanarayana, S. Roy, P.K. Bhattacharyya, K.K. Borah, K.K. Bania, *Applied Catalysis A*, **2020**, 589, 117292.
[2] A. Fürstner, *ACS Central Science*, **2016**, 2(11), 778.
[3] Z. Shen, Y. Hu, B. Li, Y. Zou, S. Li, G. Wilma Busser, X. Wang, G. Zhao, M. Muhler, *Journal of Energy Chemistry*, **2021**, 62, 338.