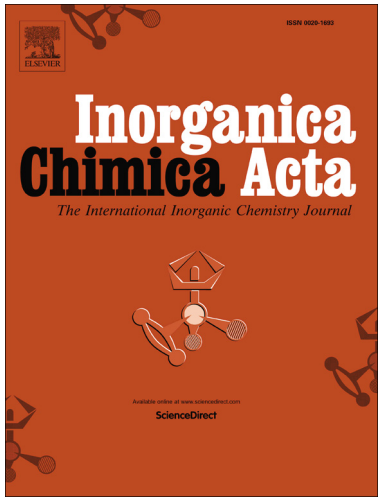

Research paper

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Joel M. Gichumbi, Holger B. Friedrich, Bernard Omondi

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Synthesis and characterization of some new half–sandwich ruthenium(II) complexes with bidentate N,N'-ligands and their application in alcohol oxidation.

Joel M. Gichumbi, Holger B. Friedrich*, Bernard Omondi

[1] School of Chemistry, University of KwaZulu-Natal, Private Bag X54001, Durban 4000, South Africa

*Corresponding author. Tel.: +27 312603107; fax: +27 312603091. E-mail address: friedric@ukzn.ac.za (H.B. Friedrich).

Abstract

A series of eight new (η^6-arene)ruthenium(II) complexes were prepared by the reaction pyridyl-imine ligands and the ruthenium(II) precursors of the general formula $[(\eta^6\text{-arene})Ru(\mu\text{-}Cl)Cl]_2$, where arene = *p*-cymene (**1**) and C_6H_6 (**2**) to form the complexes $[(\eta^6\text{-arene})RuCl(C_5H_4N\text{-}2\text{-}CH{=}N\text{-}Ar)]PF_6$ (where Ar = 2,4,6-trimethylphenyl (**a**), 2,4-dimethylphenyl (**b**), 2-methoxyphenyl (**c**), 2,6-diisopropylphenyl (**d**)). These complexes were characterized using ^{1}H NMR, ^{13}C NMR, ^{31}P NMR, IR, UV-Vis, HRMS, and TGA. The molecular structures for the complexes **1a**, **1d**, **2a** and **2d** were determined by single crystal crystallography, revealing a pseudo-octahedral piano stool geometry. In this arrangement, the ruthenium metal is coordinated to the arene ligand at the apex of the stool with one chloride and the N, N-ligand as the base. These complexes were applied as catalysts in the oxidation of cyclic, aliphatic and aromatic alcohols with $NaIO_4$ as oxidant and the complexes showed good conversions and yields to the corresponding carbonyl products.

1.0 Introduction

The oxidation of alcohols to carbonyl compounds, such as aldehydes, ketones and carboxylic acids, is an important reaction in organic synthesis [1]. Alcohol oxidation reactions are also important in industrial applications [2]. Many transition metals have been applied for this purpose and ruthenium compounds have been found to be very attractive for this transformation [3-5]. Ruthenium based oxidation catalysis have shown good utility for selective oxygenation in both homogeneous and heterogeneous catalysis [6]. This may be attributed to the ability of ruthenium to assume a wide range of coordination geometries and oxidation states which offers unique opportunities in application to catalysis [7]. Among the ruthenium complexes,