

Abstract

New water-soluble complexes $[(\eta^6\text{-C}_6\text{H}_6)\text{RuCl}(\text{C}_5\text{H}_4\text{N-2-CH}=\text{N-R})]\text{Cl}$ (**1**) (with R = 4-hydroxymethylphenyl (**a**), 2,4-dichlorophenyl (**b**), 2-fluorophenyl (**c**), 3-carboxyphenyl (**d**)) have been synthesized by reacting $[(\eta^6\text{-C}_6\text{H}_6)\text{Ru}(\mu\text{-Cl})\text{Cl}]_2$ with the *N,N'*-bidentate ligands in a 1:2 ratio. Full characterization of all complexes was accomplished using ^1H and ^{13}C NMR, elemental analyses, UV-Vis spectroscopy, IR spectroscopy and single crystal X-ray crystallography for determination of the structure of **1d**, as **1d** \cdot 4H₂O. The single crystal structure confirmed coordination of the ligand to the ruthenium(II) center leading to a structure commonly described as a pseudo-octahedral, three-legged piano stool. The geometry around the Ru(II) center is such that the arene ring occupies the apex of the stool while the *N,N'*-bidentate ligand and a chloride occupy the base of the stool. The synthesized Ru(II) complexes were tested as catalysts for oxidation of styrene using NaIO₄ as a co-oxidant in a biphasic system. All complexes were active, giving good yields of benzaldehyde. Catalyst **1c** was later investigated for olefin oxidation and gave high yields of the corresponding aldehydes as the major products in all cases.