Chemistry of Bis[2-(phenylazo)pyridine]Ruthenium(II) Complexes with 1,10-Phenanthroline and other Ligands

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Master of Science Thesis in Inorganic Chemistry

Prince of Songkla University

2003

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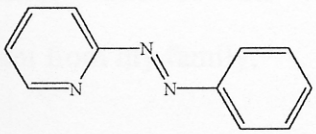
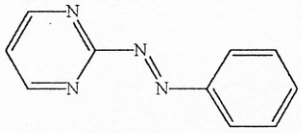
Major Program	Inorganic Chemistry
Academic Year	2002

ABSTRACT

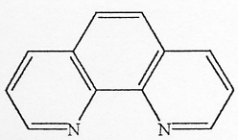
The $[Ru(azpy)_2L]^{2+}$ complexes (L = 2-(phenylazo)pyridine (azpy) (1), 2-(phenylazo)pyrimidine (azpym) (2), 2,2′-bipyridine (bpy) (3), and 1,10-phenanthroline(phen) (4)) were synthesized and characterized by spectroscopic and electrochemical methods. In addition, the molecular structures of $[Ru(azpy)_3](PF_6)_2$, $[Ru(azpy)_2bpy](PF_6)_2$ and $[Ru(azpy)_2phen](BF_4)_2$ complexes were studied by X-ray diffraction technique. The average N=N bond distance in the azpy complex was shorter than in the bpy and phen complexes, becuase the azpy ligand was a better π-acceptor than those two ligands. This result was consistent with Infrared spectroscopic data, this indicated that the N=N stretching mode in the bpy and phen complexes occurred at lower energy than the azpy and azpym complexes. There was strong competition for the ruthenium t_{2g} electrons and less π-back donation to azpy.



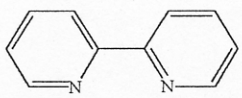
2-(phenylazo)pyridine (azpy) (1)



2-(phenylazo)pyrimidine (azpym) (2)



1,10-phenanthroline (phen) (3)



2,2′-bipyridine (bpy) (4)