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> MainPage

> About College

> Files

> Researches

> Courses

> Favorite Links

> Our Contacts

Visits Of this Page: 33



Research Title : متر اكيات الفلزات غير مشبعة التناسق كبادنة في تصميم متر اكيات مستحدثة
متر اكيات الفلزات غير مشبعة التناسق كبادنة في تصميم متر اكيات مستحدثة

Descriptipn : Dichlorotris(triphenylphosphine)ruthenium(II) $\text{RuCl}_2(\text{P}^3)_3$ is a coordinately unsaturated complex, in the sense that all the sites in its first coordination sphere are not occupied. It can undergo addition, elimination and addition elimination reactions and hence as a precursor in the syntheses of a large number of complexes that find important applications in catalysis and/or chemotherapy. In this study the synthetic versatility of this complex is explored by its reaction with a number of monodentate and bidentate nitrogen donor ligands, viz. imidazole, ethylenediamine, 1,10-phenanthroline, 2,2-bipyridyl, adenine, adenosine, cytidine, adenosine-5-triphosphoric acid, 2-deoxy-d-ribose, as well as solvent molecules such as dichloromethane, methanol, dimethyl sulfoxide, dimethyl formamide, pyridine and acetonitrile. Ruthenium(II) is attractive because strong-field low spin d_6 metal centers with pseudo-octahedral symmetry exhibit very large ligand field splittings and stabilization energies. In addition, Ru^{2+} is classified as a borderline acid and as such exhibits an affinity to borderline bases such as the nucleosides used in this work. The present work was investigated by the literature preparation of $\text{RuCl}_2(\text{P}^3)_3$ and $\text{RuCl}_2(\text{P}^3)_4$. Both complexes are slightly soluble in dichloromethane, methanol and benzene. The latter complex loses a triphenylphosphine ligand and identical spectra (UV-VIS and solution IR) are observed for both complexes. In fact the five coordinate complex loses a triphenylphosphine ligand to give $\text{RuCl}_2(\text{P}^3)_2$ in absence of added triphenylphosphine. Dissociation of P^3 is a common phenomenon in ruthenium complexes such as $[\text{RuCl}_2(\text{P}^3)_n]$ ($n = 3$ or 4). The interaction of $\text{RuCl}_2(\text{P}^3)_3$ with the ligands mentioned above was investigated. Complexes formed in solution as well as those isolated in the solid state were studied by a variety of techniques. The binding constant for the reaction of the parent complex with adenine as a representative one, was done spectrophotometrically. All complexes were subjected to conductometric studies that showed that all except the ethylenediamine complex are electrically non-conducting. The structure and physicochemical behavior was inferred from micro-analytical data, UV-VIS spectra, IR spectra and NMR spectra. All complexes gave no ESR signals and hence all the complexes are diamagnetic and NMR active. Thus the oxidation state of the metal ion is +2 and it is in a low-spin state in each complex.

Research Type : Master