

Complexation and ligand exchange in aqueous of Cu(II) and Ni(II) with hydrazides of some aromatic acids

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Abstract

Solvation and complexation of Cu(II) and Ni(II) with benzoic (L'), p-methoxybenzoic (L''), and isonicotinic (L) acid hydrazides in aqueous-ethanol solutions (ethanol mole fraction 0.07-0.68) were studied by pH-metry, spectrophotometry, and nuclear magnetic relaxation. The formation constants of the species $M(L')_2^{2+}$, $M(L')_2^{2+}$, $M(L'')_2^{2+}$, $M(L'')_2^{2+}$, $M(LH)_3^{3+}$, $M(L)_2^{2+}$, $M(L)(LH)_3^{3+}$, and $M(L)_2^{2+}$, where $M = Cu^{2+}$ and Ni^{2+} , were determined. With isonicotinic acid hydrazide, a change in the coordination mode was observed in an isomer of $Cu(L)_2^{2+}$, with one of the ligands coordinating in the bidentate fashion, and the other, in the monodentate fashion via the pyridine nitrogen atom. The suggested structures were confirmed by analysis of the parameters of the ESR and electronic absorption spectra of the complexes. The rate constants of ligand exchange and formation of the complexes $Cu(L')_2^{2+}$, $Cu(L')_2^{2+}$, $Cu(L'')_2^{2+}$, and $Cu(L'')_2^{2+}$ in aqueous solutions were determined from nuclear magnetic relaxation measurements; the reactions occur by the associative mechanism. A cyclic process of reduction of Cu(II) to colloidal copper in the presence of L'' and atmospheric oxygen is described. © Pleiades Publishing, Inc., 2006.

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