

Structural and magnetic characterization of Cu-picolinate and Cu-quinaldinate and their mixed complexes with water or halides.

Autorzy

Bogumiła Żurowska

Rok wydania

2014

Czasopismo

Inorganica Chimica Acta

Numer woluminu

418

Strony

136-152

DOI

10.1016/j.ica.2014.04.007

Kolekcja

Naukowa

Język

Angielski

Typ publikacji

Artykuł

Streszczenie

The review article contains information on the synthesis as well as structural and magnetic characterization of the copper(II) compounds based on two classes of carboxylate ligands containing heterocyclic nitrogen atom of pyridine and quinoline, i.e. pyridine-2-carboxylate (2-picolinate, 2-pic) and quinoline-2-carboxylate (2-quinaldinate, 2-qic), respectively, and water or halide ligands. In this paper, such Cu-carboxylate and Cu-carboxylate/H₂O or/halide systems are presented for which structural and magnetic data are available in literature. The above-mentioned compounds are products of direct reaction of picolinate or quinaldinate acids with copper(II) salts and hydrolytic or non-hydrolytic decomposition of some ligands. Picolinate ion forms mononuclear compound of the composition [Cu(2-pic)₂Br₂][(2-picH)₂], and polynuclear compounds of the general formula {[Cu(2-pic)₂]·2H₂O}_n, and {[Cu₂(2-pic)₃(H₂O)]X}_n, where X = ClO₄⁻, BF₄⁻ or NO₃⁻. The compound of the formula [Cu(2-pic)₂] exists in three polymorphic forms: mononuclear with Cu(N₂O₂) chromophore and two polynuclear (1D) of the same Cu(N₂O₄) chromophore. With halide ions isostructural polynuclear (2D) compounds of the formula [Cu(2-pic)X], X = Cl or Br are formed of Cu(N₂O₂X) chromophore. However, a quinaldinate ion forms compounds of the stoichiometries: two isomeric forms of [Cu(2-qic)₂·H₂O], which involve the same CuN₂O₃ chromophore (distortion isomers), and [Cu(2-qic)X], X = Cl or Br. The chloride and bromide polynuclear (2D) [Cu(2-qic)X] compounds whose crystal structure consists of two different chromophores: [Cu(N₂O₂X)] and Cu(O₂X₂) are isostructural. Crystal structure of the copper(II)-picolinate and copper(II)-quinaldinate systems indicates that carboxylate group in both ligands offers a variety of coordination modes leading to the formation of mononuclear and polynuclear compounds. The mononuclear form of [Cu(2-pic)₂] is an example of a square-planar copper(II) compound in

which structure is achieved by important π – π stacking intermolecular interaction, which leads to 1D network. Polynuclear Cu-picolinate and Cu-quinaldinate systems based on *syn-anti* or *out-of-plane* carboxylates (COO) and di- or monohalides bridges (Cl, Br) are interesting material for magnetic studies and for searching magneto-structural correlations. This paper also presents the role of non-covalent interactions (π – π stacking, hydrogen bonds) in the transmission of magnetic interactions. The magnitude of exchange interactions between copper(II) centers are discussed on the basis of molecular and crystal structures of copper(II) complexes, the properties of bonds as well as on the basis of well-known theories and thesis. Dependence of the exchange parameter J on some structural features is demonstrated and understood on the basis of the orbital mechanism of the exchange interaction.

Słowa kluczowe

copper(II), picolinate complexes, quinaldinate complexes, structure, Magnetism

Adres publiczny

<http://dx.doi.org/10.1016/j.ica.2014.04.007>

Strona internetowa wydawcy

<http://www.elsevier.com>