

## A Proton Transfer and a Nickel(II) Compound Including Pyridine-2,6-dicarboxylate and Phenylhydrazinium Ions: Synthesis, Characterization, Crystal Structure and Solution Study

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The new compounds, (phhyH)<sub>2</sub>(pydc), **1** and (phhyH)[Ni(pydc)(pydcH)].3H<sub>2</sub>O, **2**, phhy: phenylhydrazine, pydcH<sub>2</sub>: pyridine-2,6-dicarboxylic acid, were synthesized and characterized by IR, <sup>1</sup>H NMR, <sup>13</sup>C NMR and UV spectroscopy. The structure of **2** was determined by X-ray crystallography. In the crystal structure, the metal ion was six coordinated by two tridentate (pydc)<sup>2-</sup> and (pydcH)<sup>-</sup> groups and each anionic complex unit, [Ni(pydc)(pydcH)]<sup>-</sup> was accompanied by one (phhyH)<sup>+</sup> as counter ion and two water molecules. In compound **2**, a large number of O-H...O, N-H...O and C-H...O hydrogen bonds were observed. These interactions as well as other noncovalent interactions such as ion pairing, C-O...π and π-π stacking play an important role in the formation and stabilization of the crystal lattice. In the solution study, the equilibrium constants for the binary pydc-phhy proton transfer system, the stoichiometry and stability of complexation of this system with Ni<sup>2+</sup> ion in aqueous solution were investigated using potentiometric pH titration method. The stoichiometry of the most abundant species in the solution was compared to the crystalline cited metal ion complexes.

**Keywords:** Pyridine-2,6-dicarboxylic acid, Phenylhydrazine, Nickel, Proton transfer, Crystal structure, Solution study

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### INTRODUCTION

With the rapid growth in supramolecular chemistry in recent years, a great deal of effort has been devoted to the design and assembly of supramolecular compounds, due to their potential applications in the ionophore chemistry, ion pair extraction chemistry, phase transfer catalysis chemistry and so on [1,2]. Moreover, the syntheses of various supramolecular compounds help to obtain new information

about intermolecular interactions, which is obviously crucial for the rational design and construction of new framework structures [3]. Recently, several types of forces, such as coordination bonding [4-9], hydrogen bonding [10-13], π-π stacking [14,15] and electrostatic interactions [16] have been well used in constructing extended supramolecular networks.

Our research group has been interested in the synthesis of proton transfer compounds as new supramolecular synthons for the one-pot preparation of self-assembled transition metal complex-organo-networks since 2000 [17]. The successful synthesis of these systems depends on the choice of the

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