Title: Mn(II), Fe(II), Co(II), Ni(II), Cu(II) and Zn(II) transition metals isonicotinate complexes: Thermal behavior in N_2 and air atmospheres and spectroscopic characterization

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Mn(II), Fe(II), Co(II), Ni(II), Cu(II) and Zn(II) transition metals isonicotinate complexes: Thermal behavior in N_2 and air atmospheres and spectroscopic characterization

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Highlights

- The stoichiometry and hydration degree of compounds were determined.
- Previously unreported thermal behavior of the complexes has been determined.
- Through TG/DSC-FTIR thermal decomposition mechanism was proposed.
- Physical transformations were investigated by PXRD and IR spectroscopy.
- Water, CO, CO_2 and Pyridine gases were identified by EGA.

Abstract

Solid-state $M(IN)_2 \cdot nH_2O$ complexes, where M stands for bivalent transition metals (Mn, Fe, Co, Ni, Cu and Zn), IN is isonicotinate and n = 0.5 to 4.0 H_2O, were synthesized. Characterization and thermal behavior of the compounds were performed employing elemental analysis (EA), complexometric titration with EDTA, powder X-ray diffraction (PXRD), infrared spectroscopy (FTIR), simultaneous thermogravimetry and differential scanning calorimetry (TG–DSC) in dynamic dry air and nitrogen atmospheres, differential scanning calorimetry (DSC) and TG–DSC coupled to FTIR. The thermal behavior of isonicotinic acid and its sodium salt was also investigated in both atmospheres. The dehydration of these compounds occurs in a single step in both atmospheres. In air atmosphere, the thermal decomposition of the anhydrous compounds also occurs in a single step, except for the copper compound where two steps are observed. In N_2 the thermal decomposition of the anhydrous compounds occurs in two