Structure and Magnetic Properties of 3-substituted-5-(2-pyridyl) Pyrazole Metal(II) Complexes

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Five substituted pyridyl-pyrazole metal(II) complexes, [Fe(Hpp-*But*)$_3$(*X*)$_2$], *X*=ClO_4^- (***1***), BF_4^- (***2***), [Co(Hpp-*But*)$_3$(ClO_4)$_2$] (***3***), *cis*-[Fe(Hpp-ϕ)$_2$($NCS)_2$] (***4***) and *trans*-[Fe(Hpp-ϕ)$_2$($NCS)_2$]·($H_2O)_2$ (***5***), were synthesized. Molecular and crystal structures of these complexes were investigated by single crystal structure analysis. The comparison in molecular structures between these complexes will be presented. The magnetic properties were studied by SQUID magnetometer.

Complex (***1***) and (***2***), with t-Butyl substituted group, are spin-crossover compounds. Complex (***1***) is a gradual but completed spin transition from RT to 200K. The Fe $L_{2,3}$-edge of iron(II) of (***1***) and (***2***) X-ray absorption spectroscopy are studied using synchrotron radiation. The apparent change due to HS-LS transition will be presented in coordination geometry around Fe and in Fe core electron excitation. However, compound (***4***) and (***5***), with substituted phenyl group, show no spin transition phenomenon within the temperature range studied. The relationship between structure and magnetic properties will be discussed.

Keywords: structure-magnetism relationships, spin crossover, magnetism