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NOTE

A Novel Mn(II) Complex: Synthesis, Characterization and Magnetic Property

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A new Mn(II) complex: [Mn(HBTC)(H_2O)$_3$] where HBTC = 1,3,5-benzene tricarboxylic acid has been synthesized and characterized by IR spectra and elemental analysis. The relationship between the temperature and the magnetic susceptibility of the complex over the range 5~300 K indicates the presence of a antiferromagnetic interactions in the Mn(II) ions of the complex.

Key Words: Mn(II) complex, Synthesis, Magnetism.

For a molecular-based magnet consisting of magnetic metal ions coordinated with nonmagnetic organic species, both the metal ions and the organic species contribute to the observed magnetism. The metal ions are the source of magnetic moments while the organic species provide super exchange pathways between the magnetic centers[1-3]. Manganese is known to be the most complex metallic element. The manganese complexes can have different number of coordinates, generally from 2 to 7 and a variety of structures[4-6]. High-spin manganese(II) complexes are characterized by the absence of ligand field stabilization energy and the consequence is the possibility of obtaining various coordination geometries. About manganese(II) coordination complexes, there are many examples such as Ghosh *et al.*[7] carried out study of the nuclease activity of the manganese complexes [Mn(Phimp)$_2$](ClO_4) and found the complex has DNA tackiness. Rajasekharan *et al.*[8] reported a manganese complexes [Mn(acphen)NCS] and found it to exhibit antiferromagnetic property. Similarly, Mautner *et al.*[9] synthesized a manganese 1D complex [Mn(L)$_2$(N_3)$_2$]} and found that it has weak magnetic property. Moreover, the relationship of magnetic property with the structure was discussed.

Here we synthesized a metal-organic complex: [Mn(HBTC)(H_2O)$_3$](BTC = 1,3,5-benzenetricarboxylate radical) and discussed its characterization and magnetic properties.

All the reagents were of AR grade and used without further purification. Analyses for carbon, hydrogen and nitrogen were performed on a Perkin-Elmer 140 ºC analyzer. Infrared spectra (4000-400 cm^{-1}) were recorded with a Bruker Vector 22 FT-IR spectrophotometer on KBr disks.Variable temperature magnetic data (4-300 K) were collected with Quantum Design MPMS XL5 Squid magnetometer.

Synthesis of the complex: The 1.69 g $MnSO_4$·H_2O, 0.75 g glycine and 2.76 g Na_3BTC were dissolved in 30 mL H_2O solution, then stirred reaction for 2 h at 25 ºC. The white precipitation was obtained by filtered and washed 3 times. Yield 38 %. IR spectrum (KBr, ν_{max}, cm^{-1}): 3430 (ν_{O-H}); 1630, 1370 (ν_{-COO}); 1570, 1440, 764, 702 (ν_{-Ar}). Elemental analysis (%) calcd. for $C_9H_{10}O_9Mn$: C, 34.09; H, 3.18. Found: C, 34.47; H, 3.05.

The magnetic susceptibility data on the [Mn(HBTC)(H_2O)$_3$] complex were collected over the temperature range 5-300 K at 0.1 T.

Magnetic properties: Fig. 1 shows the plots of χ_m *versus* T and χ_m^{-1} *versus* T for the [Mn(HBTC)(H_2O)$_3$] complex. With the temperature was decreased, the χ_m^{-1} value decrease gradually through out the temperature range 5 to 300 K. The

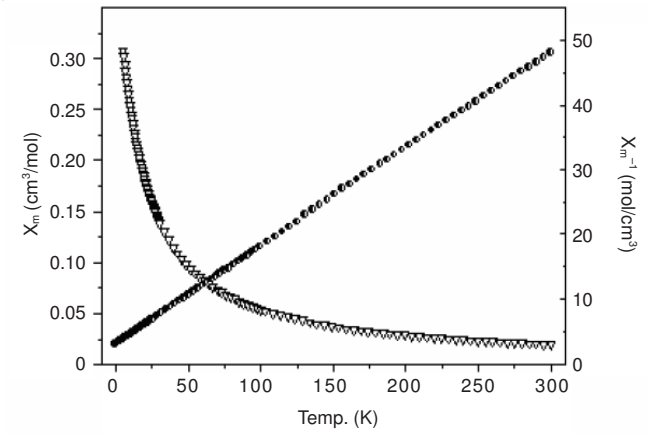

Fig. 1. X_m-T and 1/X_m-T curves of the title complex

magnetic data can be fitted well (r = 0.99732) to the Curie-Weiss law with C = 142.7 cm^3 mol^{-1} K and θ = -14.585 K, The negative value of Weiss temperature shows that there is a antiferromagnetic coupling between the Mn(II) ions of the complex.

In summary, a metal-organic complex: [Mn(HBTC)$(H_2O)_3$] was obtained and characterized by IR spectra and elemental analysis. The magnetic properties investigation indicates that there is a antiferromagnetic exchange interactions in the Mn(II) ions of the complex.

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