

NOTE

Synthesis and Magnetic Properties of Coordination Polymer of Cu(II)-Schiff Base

LIN WANG¹, JIAN-HONG BI^{1,*} and HONG-LIANG WANG²

¹Department of Chemistry and Chemical Engineering, Hefei Normal University, Hefei, P.R. China

²Zhejiang Huahai Pharmaceuticals Co. Ltd, Linhai 317024, P.R. China

*Corresponding author: E-mail: bi010101@126.com

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A copper(II) coordination polymer with the composition $[\text{CuL}]_4(\text{ClO}_4)_8(\text{H}_2\text{O})_8(\text{CH}_3\text{OH})_{0.5}$ ($\text{L} = (6Z,15Z)\text{-N1',N2'-bis[amino(pyridin-2-yl)methylene]oxalohydrazide}$) has been synthesized by self-assembly and characterized by IR spectra, elemental analysis and TG measurement. The magnetic properties indicates that there is a weak antiferromagnetic interactions between the copper(II) ions in molecule of the coordination polymer.

Key Words: Self-assembly, Schiff base, Coordination polymer, Copper(II), Curie-Weiss law, Magnetic property.

Nowadays, coordination polymer materials have shown excellent feasibility applications in the fields of magnetism, catalyst, electrology, photics and porous materials¹⁻⁵. Compared with the traditional inorganic magnetic materials, the coordination polymer magnetic materials have low density, good processing performance, high transparency, easy synthesis and mild conditions⁶⁻⁹. Here we report a new coordination polymer, $[\text{CuL}]_4(\text{ClO}_4)_8(\text{H}_2\text{O})_8(\text{CH}_3\text{OH})_{0.5}$ ($\text{L} = (6Z,15Z)\text{-N1',N2'-bis[amino(pyridine-2-yl)methylene]oxalohydrazide}$), self-assembly synthesis and magnetic properties.

All the reagents were of AR grade. The ligand (6Z,15Z)-N1',N2'-bis[amino(pyridine-2-yl)methylene]oxalohydrazide was prepared according to the literature¹⁰. Elemental analysis were performed on a Elementar Vario ELZ(III) analyzer. IR spectra were recorded on a Nexus-870 spectrophotometer. TG-DSC analyses were obtained with a STA449F3 thermoanalyzer. Magnetic data (2.0-188 K) were collected with Quantum Design MPMS XL5 squid magnetometer.

Synthesis of the coordination polymer: 1.48 g $\text{Cu}(\text{ClO}_4)_2 \cdot 6\text{H}_2\text{O}$ was dissolved into a mixture of 10 mL H_2O , then 0.33 g of the ligand in 10 mL methanol was added and stirred for 2 h in room temperature. After filtering and standing at room temperature for three days, the black solids were obtained. Yield 90 %. IR spectrum (KBr, ν_{max} , cm^{-1}): 3350, 3167(N-H, O-H); 1664, 1580 (C=N); 1090, 631 (ClO_4^-). Elemental analysis: Calcd. (%): C, 26.98; H, 2.97; N, 17.82; Found (%): C, 26.79; H, 2.82; N, 17.65. Thermogravimetry was done at 25 to 550 °C (5 °C, min^{-1}). TG-DSC data displays that the number of the hydrated water molecules in line with

that of elemental analysis. The magnetic susceptibility data of the coordination polymer were received over the temperature range 2.0~188 K.

The self-assembly synthesis of the coordination polymer was achieved by the reaction of the ligand L with $\text{Cu}(\text{ClO}_4)_2 \cdot 6\text{H}_2\text{O}$ and characterized by IR, elemental analyses and TG measurement. The result is consistent with the composition of $[\text{Cu}(\text{C}_{14}\text{H}_{14}\text{N}_8\text{O}_2)]_4(\text{ClO}_4)_8(\text{H}_2\text{O})_8(\text{CH}_3\text{OH})_{0.5}$.

Magnetic properties: Fig. 1 is the plots of χ_m versus T and $1/\chi_m$ versus T for the coordination polymer. When the temperature was decreased from 188 to 31 K, the χ_m values increased gradually from 0.00145 to 0.0187 cm^3/mol . This indicates that the χ_m of the compound is accord with the Curie-Weiss law in wide temperature range: $R = 0.99985$, $C = 4.66 \text{ cm}^3 \text{ mol}^{-1} \text{ K}$ and $\theta = -94.9 \text{ K}$. When the temperature was decreased from

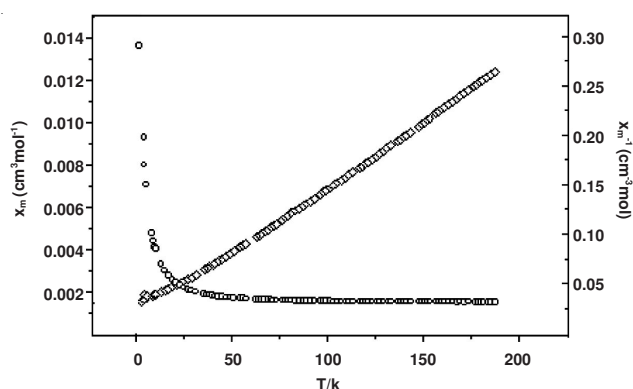


Fig. 1. χ_m -T and $1/\chi_m$ -T curves of the coordination polymer

31 to 2 K, the χ_m values increased rapidly from 0.0187 to 0.0136 cm³/mol. This shows that there are intramolecular anti-ferromagnetic exchange coupling between the Cu(II) ions in molecule of the coordination polymer¹¹.

In summary, a novel Schiff-base copper(II) coordination polymer is obtained at room temperature and characterized by IR spectra, elemental analysis and TG measurement. The magnetic properties show that there is a weak antiferromagnetic interactions between the Cu(II) ions in molecule of the coordination polymer.

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