# Spin-glass behaviour in a metal-organic $[Co(C_3H_3N_2)_2]_n$ polymer

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The magnetic behavior of a metal-organic $[Co(C_3H_3N_2)_2]_n$ polymer has been investigated by magnetization and specific heat measurements. Low-field magnetic susceptibility shows the presence of two maxima at $\sim 8$ and 4 K, respectively. The first maximum of a broad feature was attributed to a short-range low-dimensional antiferro-magnetic behavior and the second with a more sharp structure the existence of a spin-glass-like state. This state was evidenced by magnetic irreversibility observed in the zero-field cooled and field-cooled data, and confirmed by specific heat measurements. The magnetic specific heat ($C_{mag}$) shows a lack of any long-range-ordered peak. Instead, a broad maximum near $T_f$ was observed in the $C_{mag}/T(T)$-curve. Below $T_f$, the $C_{mag}/T$ data follow a relation: $C_{mag}/T = \gamma + AT$. We suggest that the competition of antiferromagnetic (AF) intra-chain and ferromagnetic (F) inter-chain interactions in a low-dimensional arrangement of magnetic $Co^{2+}$ ions can produce the spin-glass behavior in the sample. The susceptibility data analyzed in terms of a spin $S = 3/2$ Heisenberg linear-chain model with small exchange energy are consistent with the presence of F and AF interactions. Splitting of the energy levels of the $Co^{2+}$ ions in the crystal field causes a Schottky-type specific heat anomaly around 60 K.

9.7 cm

13.4 cm

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