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Low-Frequency Spin Dynamics of Thioether-Bridged Cobalt-Dioxolene Complexes

Valence tautomers (VTCs) undergo a reversible charge redistribution when subject to the variation of external thermodynamic parameters (e.g. temperature). Conversely, the electronic modification acts as a switch for the magnetic state of the compound.

Here, we report on our experimental study of a cobalt-based VTC, $[\text{Co}(\text{Me}_2\text{tpa})]_2(\text{diox-S-diox})(\text{PF}_6)_2 \cdot \text{MeOH}$ [1]. By means of SQUID magnetometry we uncovered a low-spin paramagnetic state of the molecule at low temperatures, which is progressively switched to high-spin upon increasing temperature. The magnetic behavior of the VTC was compared to that of two reference samples, which exhibit a fixed magnetic state (low-spin and high-spin, respectively) over the total investigated temperature range.

At $T=25\text{K}$, nuclear magnetic resonance measurements indicate the onset of population on the energy levels for the three compounds. We also acquired information about a seemingly thermal history of the LS-reference, which requires further investigation in future works.

[1] G.Poneti et al., Inorg. Chem. 52, 11798 (2013)

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