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Pressure study of molecular magnet based on 3d and 4d metals

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The pressure measurements of magnetic materials give the opportunity to study the fundamental aspects of magnetism. In this study a molecular ferromagnet Co^{II}(pyrazol)₄]₂[Nb^{IV}(CN)<sub> has been studied with the use of ac/dc magnetometry under hydrostatic pressure up to 13 kbar. The studied compound crystallizes in the I4₁/a space group where cyanido-bridged structure is decorated with pyrazole molecules coordinated to Co^{II} centers [1]. It is a unique structure with one type of CoII -NC-NbIV linkage. The spin values of both magnetic ions are ½, with g_{Co}≈4.55, g_{Nb}≈2.0 for cobalt and niobium respectively. The phase transition in ambient pressure occurs at T_C=5.4 K. Initially applying pressure shifts the temperature of phase transition to lower values down to a critical point, after which further applied pressure starts to increase the T_C. It has been proved that the compound is changing from a ferromagnetic ordered magnet without pressure to a ferrimagnet in high pressure.

[1] D. Pinkowicz, R. Pełka, O. Drath, W. Nitek, M. Bałanda, A. M. Majcher, G. Poneti and B. Sieklucka, Inorg. Chem,. 2010, 49, 7565-7576.

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