البحث الاول (بحث رقم 1 فى قائمة الأبحاثمحل تقييم اللجنة الموقرة)

Title	Trigonal antiprismatic Co(II) single moleculemagnets with large uniaxial anisotropies:importance of Raman and tunneling mechanisms
	جزيئات الكوبلت المغناطيسية ذات التباين المحورى الكبير
Authors	Yuan-Zhu Zhang, Silvia Gomez-Coca, Andrew J. Brown, **Mohamed R. Saber,** Xuan Zhang and Kim R. Dunbar.
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Abstract:

The synthesis, magneto-structural and theoretical studies of mononuclear Co(II) compounds $[CoII(Tpm)_2][ClO_4]_2$ (**1**, Tpm= tris(pyrazol-1-yl)methane),$[CoII(Tpm)_2][BPh_4]_2.2MeCN$ (**2**) with trigonal antiprismatic geometry (trigonally elongated octahedralgeometry) are reported. Magnetic and theoretical studies reveal that the complexes exhibit singlemoleculemagnet behavior with uniaxial anisotropy and a huge energy difference between ground andfirst excited Karmers' doublets (-200 cm^{-1}). Under applied DC fields, compounds **1** and **2** exhibitfrequency and temperature dependence of the imaginary susceptibility. The fit of the data to an Orbachrelaxation process yields effective energy barriers of 30.6(1) and 44.7(6) cm^{-1} for 1 and 2, respectively,but there is no real state at that energy. The inclusion of tunneling, direct and Raman relaxationprocesses leads to the conclusion that the inclusion of an Orbach process is not required to providea good fit to the data. More interestingly, a detailed study of the dependence of the relaxation time withfield shows that for these Kramers' ions, tunneling is the predominant process at low temperature andthat differences in the counteranion allow for a tuning of the Raman process at higher temperatures.These findings underscore the fact that large uniaxial anisotropy can be achieved in hexacoordinateCo(II) trigonal antiprismatic complexes which is an unexplored geometry in mononuclear single moleculemagnets