[*C9.* C. Doussier-Brochard] Magnetic structure of an antimony manganese chlorosulfide $MnSbS_2Cl$

Relatively to chalcogenides or halogenides, mixed compounds of the halogeno-chalcogenide type have been poorly studied up to now. Among them, quaternary compounds combining a transition metal *TM* with another cation are of special interest for their physical properties, due to the dilution of *TM* in the crystal matrix and the competition of the two types of cations versus the two ligands.

The crystal structure of $MnSbS_2Cl$ can be described as edge-sharing MnS_4Cl_2 octahedra along the b-axis, and corner-sharing along the *a*-axis, forming waved layers separated by Bi atoms. The magnetic susceptibility versus temperature, shows a large maximum, around 39 K, characteristic of a low-dimensional anti-ferromagnetic behaviour, following by an increase at 27K.

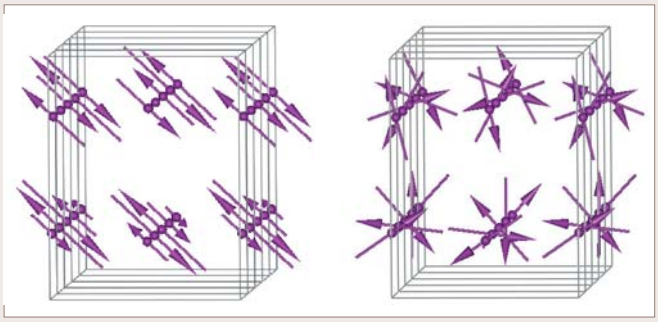
To elucidate this magnetic behaviour, powder neutron diffraction experiments were performed on the multi-detector G4.1 and allowed us to solve the magnetic structure and its thermal evolution [1]. Below T_N=35 K, a complex 3D long-range antiferromagnetic ordering takes place, characterized by an incommensurate 1D propagation wave-vector along the *b*-axis, equal to k = [0, 0.3838, 0]. The Rietveld refinements give two possible modulation models, sinusoidal and helicoidal, with similar magnetic reliability factors and a moment of 4.5 μ_B on Mn at 1.5 K.

$MnSb_2S_4$ and $MnPb_4Sb_6S_{14}$, which present chains of MnS_4 octahedra separated respectively by 6 and 16 Å, have been also studied to show the evolution of magnetic structure versus 2D or 1D organization [2].

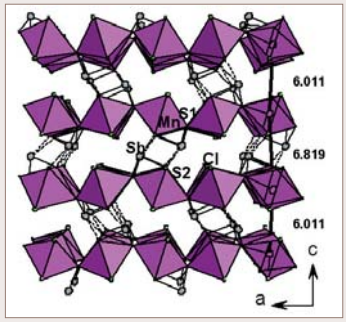
[1] C. Doussier[a], G. André[b], P. Léone[a], E. Janod[a], Y. Moëlo[a], Journal of Solid State Chemistry, 179 (2006) 486

[2] C. Doussier, thesis, Université de Nantes (2006)

[Collaboration : C. Doussier, P. Léone, E. Janod, Y. Moëlo Université de Nantes, G. André, LLB]



Magnetic structure with sinusoidal (left) or helicoidal (right) modulation

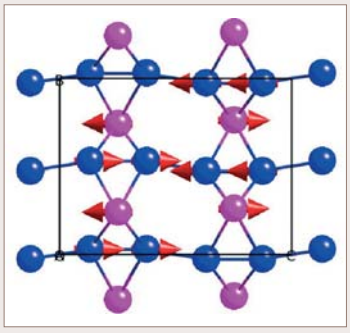


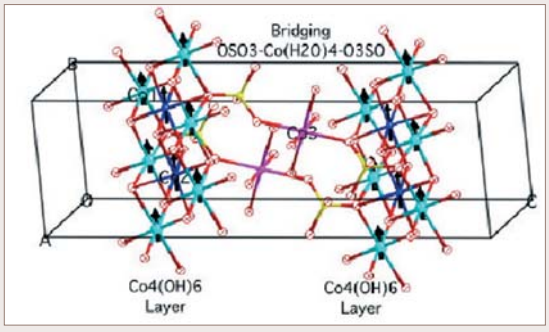
Crystal structure of $MnSbS_2Cl$

[*C10.* S. Vilminot] Magnetic structures of the synthetic magnetic minerals based on hydroxysulfates of divalent metals, $Co_3(OD)_2(SO_4)_2$, $Co_5(OD)_6(SO_4)_2(H_2O)_4$, $Cu_4(OD)_6SO_4$

High-resolution (3T2) and high-flux (G4.1) neutron powder diffraction (NPD) data have been used to determine the nuclear and magnetic structures of a series of M^{II}-hydroxysulfates, M = Mn, Co, Ni and Cu, as part of an ongoing project to understand short-range (SRO) and long-range (LRO) magnetic ordering and geometrical frustration caused by μ_3-OH bridges. For the $\mathbf{M_3(OD)_2(SO_4)_2}$ series which are canted antiferromagnets [T_N = 42 (Co), 26 (Mn) and 29 K (Ni)], the Ni exhibits collinear moments along b while for Co and Mn the moments lie in the *ac*-plane with a rare co-existence of SRO and LRO.[1] $Co_5(OD)_6(SO_4)_2(H_2O)_4$ consists of triangular Co^{II}-OH layers pillared by …O_3SO-Co^{II} $(H2O)_4$-OSO_3…and it behaves as a ferromagnet below 14 K.[2] Extensive magnetization by varying temperature, field and pressure and heat capacity measurements and NPD reveal an easy-plane XY-magnet where the moment of the pillaring Co remains random. Due to slight anisotropy in the layer the moments are oriented along b. These results demonstrate, for the first time, the existence of LRO in a single layer. $\mathbf{Cu_4(OD)_6SO_4}$ has a complex corrugated layered structure and it behaves as a canted AF. NPD was modelled with the moments oriented collinearly perpendicular to the corrugated planes with alternation along ±a for neighbouring chains within double chains building up the planes [3].

[Collaboration : S. Vilminot, IPCMS, Strasbourg; G. André, F. Bourée-Vigneron, LLB; M. Kurmoo, ULP, Strasbourg]





$Co_3(OD)_2(SO_4)_2$
$Co_5(OD)_6(SO_4)_2(H_2O)_4$

[1] M. Ben Salah *et al., Chem. Mater. 17* (2005) 2612-2621.

[2] M. Ben Salah *et al., J. Am. Chem. Soc. 128* (2006) 7972-7981.

[3] S. Vilminot *et al., Dalton Trans.*, (2006) 1455-1462.