Experimental study of magnetostructural correlations in low-dimensional quantum magnets Cu(en)Cl_2 and Cu(tn)Cl_2

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Previous studies of powder Cu(tn)Cl_2, (tn = $C_3H_{10}N_2$), did not observe a phase transition to long range order down to 50 mK and the compound was identified as a good realization of the $S = 1/2$ two-dimensional Heisenberg antiferromagnet with an effective intra-layer exchange coupling $J/k_B \approx 3$ K. Application of magnetic field induced a response characteristic for a Berezinskii-Kosterlitz-Thouless transition. While the replacement of tn by en = $C_2H_8N_2$ did not introduce significant changes of the local environment of Cu(II) ion, the symmetry of crystal structure was lowered from orthorhombic to monoclinic. This change affected magnetic properties of Cu(en)Cl_2. Our comparative study of powder susceptibilities revealed a significant decrease of exchange coupling, projecting in Curie temperatures θ = -4.17 K and -0.75 K for Cu(tn)Cl_2 and Cu(en)Cl_2, respectively. As expected, g-factors were found very similar, $g = 2.01 \pm 0.05$ for Cu(en)Cl_2 and 2.07 ± 0.05 for Cu(tn)Cl_2. In the future, the study of magnetic properties in both magnetic systems will be investigated on the monocrystalline samples.