Magnetic properties of the $R_2\text{MgCo}_9$ ($R = \text{Y, Nd, Tb}$) compounds and $\text{Nd}_2\text{MgCo}_9\text{H}_{11.4}$ hydride

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New $R_2\text{MgCo}_9$ ($R = \text{Y, Nd, Tb}$) compounds have been synthesized by powder sintering method and corresponding hydrides have been prepared by solid gas method. Their crystal structure and magnetic properties have been systematically studied. X-ray diffraction analysis showed that all $R_2\text{MgCo}_9$ compounds belong to the PuNi$_3$-type structure. The $\text{Nd}_2\text{MgCo}_9\text{H}_{11.4}$ hydride preserves PuNi$_3$-type structure with hydrogen-induced volume expansion 16.7%. The influence of the $R$ element on the magnetic properties of $R_2\text{MgCo}_9$ compounds have shown that $R_2\text{MgCo}_9$ ($R = \text{Y, Nd}$) compounds are ferromagnetic (ferrimagnetic for Tb) with high Curie temperature $T_C = 612, 635$ and $525$ K respectively. A spin reorientation at $407$ and $225$ K have been observed for $R_2\text{MgCo}_9$ ($R = \text{Y, Nd}$) respectively. Hydrogenation of $\text{Nd}_2\text{MgCo}_9$ causes the decrease of the transition temperatures due to a weakening of the magnetic interactions and probably a change of magnetic order (to antiferromagnetic with $T_N = 265$ K) and various spin reorientations at lower temperatures [1].

References: