Magnetic properties of the $Y_{1-x}La_xCo_4B$ (x=0 to 1) pseudoternary compounds: High and low field studies

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Abstract: The YCo_4B compound is known to crystalline in the $CeCo_4B$ structure with an average Co magnetic moment of 0.7?$_B$ which is much smaller than the Co moment of 1.6?$_B$ in YCo_5. Previously, we have shown that the basal-plane anisotropy of Co in YCo_4B changes into easy-axis with increasing temperature (around 150K) or by substituting of La by Y. The present study has been carried out on free-powder and magnetically-aligned $Y_{1-x}La_xCo_4B$ samples with x=0.0, 0.2, 0.5, 0.8 and 1.0. Magnetisation measurements were performed at 4.2 K in low (static) fields (up to 4 T) and in high pulsed fields (up to 35 T). The main results are: i) up to 35 T, no transition is observed, the high-field susceptibility shows an induced Co moment of 0.004?$_B$/T; ii) at 4.2 K the compounds with x=0.8 and 1.0 show easy-axis anisotropy, whereas the others have easy-plane anisotropy; iii) the saturation magnetisation is anisotropic with ???/?$_s$ values increasing from 0.008 for YCo_4B to 0.03 for $LaCo_4B$. This magnetisation anisotropy is compared to the ratio of the magnetocrystalline anisotropy energy and the exchange energy. ?? 1992.

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