The Crystal Data of Ternary Rare Earth Borides, RCo_2B_2

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Abstract

Compounds with the composition of RCo_2B_2 (R=La, Nd, Sm, Gd, Tb, Dy, and Y) were prepared by arc-melting methods. Their crystal structure was investigated by means of X-ray diffraction. These ternary rare earth borides crystallize in the tetragonal lattice. The lattice parameters are $a=3.616\pm0.003$ Å and $c=10.215\pm0.005$ Å for $LaCo_2B_2$ and $a=3.561+0.002$ Å and $c=9.358\pm0.005$ Å for YCo_2B_2. The good agreement between the X-ray diffraction intensities observed and those calculated shows that the ternary borides, $LaCo_2B_2$ and YCo_2-B_2, crystallize in the $ThCr_2Si_2$-type structure. The crystallographic data obtained for $LaCo_2B_2$ and YCo_2B_2 are as follows: space group 14/mmm (D_{4h}^{17}); R in 2(a), 4Co in 4(d), and 4B in 4(e) with $z\sim3/8$. The boron atoms in this structure are situated at the center of a trigonal prism formed by four rare earth atoms and two cobalt atoms. We also found the RCo_2B_2 compounds to be isostructural with $LaCo_2B_2$ and YCo_2B_2, where R=Nd, Sm, Gd, Tb, and Dy. However, efforts to prepare $CeCo_2B_2$ and $ErCo_2B_2$ by arc-melting were unsuccessful.

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