


High-Pressure Preparation, Crystal Structure, and Properties of $RE_4B_6O_{15}$ ($RE = Dy, Ho$) with an Extension of the “Fundamental Building Block”-Descriptors

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High-pressure/high-temperature conditions of 8 GPa and 1000 °C were used to synthesize the new rare earth oxoborates $RE_4B_6O_{15}$ ($RE = Dy, Ho$) in a Walker-type multianvil apparatus. The single crystal X-ray structure determination of $Ho_4B_6O_{15}$ revealed the following data: $C2/c$, $a = 1164.1(1)$, $b = 436.7(1)$, $c = 1882.5(1)$ pm, $\beta = 96.71(1)^\circ$, $Z = 4$, $R1 = 0.0291$, $wR2 = 0.0505$ (all data). The two isotypic compounds exhibit a new structure type built up from corrugated layers of BO_4 tetrahedra. In contrast to all known oxoborates the linking of the BO_4 tetrahedra is partially realized *via* common edges. Regarding the “fundamental building block”-concept, we introduce a new descriptor “” for edge-sharing BO_4 tetrahedra. Temperature-resolved *in situ* powder diffraction measurements and IR/Raman-spectroscopic investigations on $Dy_4B_6O_{15}$ are also reported.

Key words: High-Pressure, Borates, Fundamental Building Block