

High-Temperature Synthesis, Crystal Structure, and Properties of the New Sodium Rare-Earth Oxide Borates $\text{Na}_2\text{RE}_2(\text{BO}_3)_2\text{O}$ ($\text{RE} = \text{Dy}, \text{Ho}$)

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Dedicated to Professor Hubert Schmidbaur on the occasion of his 70th birthday

The new monoclinic oxide borates $\text{Na}_2\text{RE}_2(\text{BO}_3)_2\text{O}$ ($\text{RE} = \text{Dy}, \text{Ho}$) were synthesized using standard solid-state reactions in the temperature range 900–950 °C. They are isotypic to the known phases $\text{Na}_2\text{RE}_2(\text{BO}_3)_2\text{O}$ ($\text{RE} = \text{Y}, \text{La}, \text{Nd}, \text{Sm-Gd}, \text{Er}$). The single crystal X-ray structure determination of $\text{Na}_2\text{Dy}_2(\text{BO}_3)_2\text{O}$ revealed: $P2_1/c$, $a = 1063.9(1)$, $b = 626.2(1)$, $c = 1025.3(1)$ pm, $\beta = 117.76(1)^\circ$, $Z = 4$, $R1 = 0.0221$, $wR2 = 0.0402$ (all data). The corresponding lattice parameters of $\text{Na}_2\text{Ho}_2(\text{BO}_3)_2\text{O}$ determined from powder data are $a = 1061.2(5)$, $b = 623.7(2)$, $c = 1022.5(3)$ pm, and $\beta = 117.7(1)^\circ$. The structure consists of infinite sheets of REO_8 -polyhedra in the bc -plane, which are separated by sodium atoms. The BO_3 -groups are isolated forming layers in the bc -plane. The results of IR-spectroscopic investigations, temperature-resolved in-situ powder-diffraction measurements, and DTA/TG measurements on $\text{Na}_2\text{Dy}_2(\text{BO}_3)_2\text{O}$ are also presented.

Key words: Solid-State Synthesis, Oxide Borates, Crystal Structure