

La(OH)₂I(H₂O): Closing a Gap in Rare Earth Hydroxide Halide Structural Chemistry

Tom Nilges

Institut für Anorganische und Analytische Chemie, Westfälische Wilhelms-Universität Münster,
Corrensstraße 30, D-48149 Münster, Germany

Reprint requests to Dr. T. Nilges. Fax: +49 251 36002. E-mail: nilges@uni-muenster.de

Z. Naturforsch. **61b**, 117 – 122 (2006); received November 25, 2005

UCl₃ type La(OH)₂I can be stabilized by additional water molecules during a hydrothermal synthesis from hydroiodic acid and lanthanum carbonate hydrate at 453 K to form La(OH)₂I(H₂O). The new rare earth (*RE*) hydroxide halide hydrate crystallizes monoclinically, space group *C2/m* with lattice parameters of $a = 19.691(3)$, $b = 4.136(1)$, $c = 6.286(1)$ Å, $\beta = 108.45(1)^\circ$ and $V = 485.6(2)$ Å³, $wR2 = 0.0695$, 648 F^2 values and 32 variables. La centered, distorted, tricapped, trigonal prisms formed by iodide, (OH[−])- and (H₂O) groups are connected *via* common edges in [001]-direction and common faces in [010]-direction to built up a zigzag like layered arrangement. Hydrogen bonding between the water molecules and iodide ions of adjacent La(OH)₂I layers stabilize the UCl₃ related structure, which was only observed for the lighter homologues La(OH)₂X ($X = \text{Cl, Br}$) so far. DTA/TG and IR measurements substantiated the occurrence of (H₂O)- and (OH[−])-groups and semiquantitative EDX analyses proved a 1:1 composition for La:I in La(OH)₂I(H₂O).

Key words: Rare Earth Elements, Hydrates, Hydrogen Bonding, Hydrothermal Synthesis