Synthesis and Structure of $RhMg_3$ and Ir_3Mg_{13}

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Z. Naturforsch. **59b,** 251 – 255 (2004); received December 20, 2003

Dedicated to Professor Evgen Ivanovych Gladyshevskii on the occasion of his 80th birthday

The binary transition metal magnesium compounds $RhMg_3$ and Ir_3Mg_{13} have been synthesized from the elements in sealed niobium tubes and investigated on the basis of X-ray powder and single crystal data: Cu_3P type, $P6_3cm$, $a = 790.5(4)$, $c = 825.6(3)$ pm, $wR2 = 0.0244$, 344 F^2 values, 27 variable parameters for $RhMg_3$, and $R\bar{3}c$, $a = 1607.0(2)$, $c = 844.88(9)$ pm, $wR2 = 0.0535$, 656 F^2 values, 29 variable parameters for Ir_3Mg_{13}. The rhodium atoms in $RhMg_3$ have coordination number 11. These polyhedra show an AB AB stacking sequence like in the hexagonal close-packed structure. The crystal chemical relation of the Cu_3P type structure of $RhMg_3$ with the aristotype Na_3As ($IrAl_3$) is discussed on the basis of a group-subgroup scheme. Ir_3Mg_{13} crystallizes with a new complex structure type with coordination numbers of 11, 14, 15, 14, and 12 for the Ir, Mg1, Mg2, Mg3, and Mg4 atoms, respectively.

Key words: Magnesium, Crystal Structure, Solid State Synthesis