An Anhydrous High-pressure Synthesis Route to Rutile Type RhO_2

Gérard Demazeau[a], Alexis Baranov[a, b], Rainer Pöttgen[c], Lorenz Kienle[d], Manfred H. Möller[c], Rolf-Dieter Hoffmann[c], and Martin Valldor[e]

[a] Institut de Chimie de la Matière Condensée de Bordeaux, Centre de Ressources Hautes Pressions (ICMCB–CNRS and ENSCPB), Université Bordeaux 1 ≪Sciences et Technologies≫, 87 Avenue du Docteur A. Schweitzer, 33608 Pessac Cedex, France
[b] Department of Chemistry, Lomonosov University, 119992 Moscow, Russia
[c] Institut für Anorganische und Analytische Chemie, Westfälische Wilhelms-Universität Münster, Corrensstraße 30, 48149 Münster, Germany
[d] Max-Planck-Institut für Festkörperforschung, Heisenbergstraße 1, 70569 Stuttgart, Germany
[e] Institut für Physik der Kondensierten Materie, Technische Universität Braunschweig, Mendelssohnstraße 3, 38106 Braunschweig, Germany

Reprint requests to R. Pöttgen. E-mail: pottgen@uni-muenster.de

Z. Naturforsch. **61b,** 1500 – 1506 (2006); received June 3, 2006

A new anhydrous high-pressure synthesis route was developed for rutile type RhO_2. Rhodium(III) chloride was reacted with Na_2O_2 at 600 °C under an oxygen pressure of 200 MPa yielding RhO_2 and NaCl. X-ray powder diffractometer data and TEM observations confirmed the rutile structure: $P4_2/mnm$, $a = 448.7(1)$, $c = 308.9(1)$ pm, $x(\mathrm{O}) = 0.3125(8)$, leading to Rh–O distances of 195.0 (4×) and 198.3 pm (2×) in the slightly elongated octahedra. Structural transformations associated with the production of oxygen vacancies can be initiated by electron-beam heating.

Key words: High-pressure Synthesis, Crystal Chemistry