Silver(I)-oxides with a high ratio cations/oxygen show unusual structural features with respect to the arrangement of Ag⁺. The positively charged silver particles aggregate to form cluster-like aggregates together with Ag-Ag distances in the same order of magnitude as those in metallic silver (Jansen, J. Less-Common Metals, 1980, 76, 285). This tendency causes formation of special crystal structures which are not isostructural to those of ternary alkali iodides of respective composition. By synthesis and investigation of new silver(I)-borates we can demonstrate that these findings hold for the pairs Ag₃BO₂/Ag₂BO₃ and Na₂BO₂/Ag₂BO₃, too.

Ag₂BO₃ (Jansen, Scheld, Z. Anorg. Allg. Chem., in press) is dimorphic (Jansen, Brochtel, to be published). Both modifications as well as Ag₂BO₃ (Brochtel, Jansen, Z. Anorg. Allg. Chem., in press) have been prepared by solid state reaction of the binary components using elevated oxygen pressures (p(0₂) > 1500 bar). The crystal structures of Ag₂BO₃(I) and Ag₂BO₃(II) are identical with respect to the silver partial structures, whereas the linkages of Ag₆- and BO₃-polyhedra is completely different. Ag₂BO₃ contains instead of the expected cyclo-trimetaborate-anions a BO₆-polyanion with boron coordinated in trigonal-planar by oxygen.

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The title compound, prepared at 1300°C and 60-65 kbar by reaction of Cr₂O₃ and Ba₂CrO₄ as a mixture of products, crystallizes in space group P6₃/mmc, a = 5.649 ± 0.002, c = 32.461 ± 0.005 Å. The structure was determined from 346 independent, observed, reflections collected by automated counter methods and refined by least squares to a conventional R of 4.1%. The fourteen layer stacking sequence of close packed Ba₂O₃ layers in Zhdanov notation is [2(3)2/2(3)2]. All O₆ octahedral sites are occupied by Cr. Despite the different repeat distances, the fourteen layer is structurally closely related to the four, six, and twenty-seven layer polytypes, and all are stoichiometric. These polytypes differ from the twelve layer barium chromate oxide in both structural features and composition.

The three-oxide compounds with perovskite structure have been studied in many works. In these compounds B' and B'' are two cations with small ionic radii and different valence states.

In the present work three-oxide compounds with K₃Nif₂-type structure (derived from perovskite structure) were synthesized. The cations were pentavalent Nb and Ta, and divalent Ni and Co. The starting raw materials were high-purity oxides and carbonates. The compounds were prepared by solid-state reaction of the appropriate components. The temperature range was 1000-1600°C for several periods of time, in air atmosphere.

The samples were examined by X-ray diffraction at room temperature. The powder diffraction patterns were indexed, and the lattice constants for the different synthesized compounds were calculated.

Four new compounds (Sr₂Nb₂O₇, Sr₂Ta₂O₇, Sr₂Ta₂NIO₁₂, Sr₂Ta₃NIO₁₂, and Sr₂Ta₃CoO₁₂) were identified. All of them are unstable, and decompose above 1400°C. In some cases (Co compounds), intermediate structures between perovskite and K₃Nif₂-structures appeared in the whole temperature range studied.

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