

Charge Carriers and dc Polarization Phenomena in Solid Na₂WO₄. P. H. BOTTELBERGHS AND E. EVERTS. Inorganic Chemistry Department, State University Utrecht, Croesestraat 77a, Utrecht, The Netherlands. Ionic transport measurements based on the Tubandt method have been performed in all three solid phases of Na₂WO₄, at temperatures between 550 and 600°C in air. It is shown that $t_{\text{Na}^+} = 1.00$ in all cases. Ag is oxidized anodically to Ag⁺ at Ag/Na₂WO₄ interfaces. Cathodically only (air)-oxygen reduction occurs, resulting in the formation of a poorly conducting layer of Na₂O and Na₂CO₃ at the cathode.

Crystal Structures of the Fluorite-Related Phases CaHf₄O₉ and Ca₆Hf₁₉O₄₄. J. G. ALLPRESS, H. J. ROSSELL, AND H. G. SCOTT. Division of Tribophysics, CSIRO, University of Melbourne, Parkville, Victoria 3052, Australia. Crystal structures for the fluorite-related phases CaHf₄O₉ (ϕ_1) and Ca₆Hf₁₉O₄₄ (ϕ_2) have been determined from X-ray powder diffraction data. ϕ_1 is monoclinic, $C2/c$ with $a = 17.698 \text{ \AA}$, $b = 14.500 \text{ \AA}$, $c = 12.021 \text{ \AA}$, $\beta = 119.47^\circ$ and $Z = 16$. ϕ_2 is rhombohedral, $R\bar{3}c$ with $a = 12.058 \text{ \AA}$, $\alpha = 98.31^\circ$, and $Z = 2$. Both phases are superstructures derived from the defect fluorite structure by ordering of the cations and of the anion vacancies. The ordering is such that the calcium ions are always eight-coordinated by oxygen ions, while the hafnium ions may be six-, seven- or eight-coordinated. The closest approach of anion vacancies is a $1/2\langle 111 \rangle$ fluorite subcell vector, and in each structure vacancies with this separation form strings.

Etude des Propriétés Magnétiques, Electriques, et Optiques des Phases de Structure Pérovskite SrVO_{2.90} et SrVO₃. P. DOUGIER, J. C. C. FAN, AND J. B. GOODENOUGH. Laboratoire de Chimie du Solide du C.N.R.S., Université de Bordeaux, 351 Cours de la Liberation, 33405 Talence, France. The magnetic, electrical and optical properties of the perovskite-type phases SrVO_{2.90} and SrVO₃ have been investigated. They have been explained by an overlapping band model corresponding to two pseudoparticle states with one and two π^* electrons per vanadium ion. A weak ferromagnetism in SrVO₃ can be interpreted to be due to a ferromagnetic spin-density wave analogous to the antiferromagnetic spin-density wave occurring in elemental chromium.

A Single-Crystal Study of Barium Tungsten Lithium Oxide, a Compound with a Ten-Layer Structure. E. F. JENDREK, A. D. POTOFF, L. KATZ. Department of Chemistry and Institute of Materials Science University of Connecticut, Storrs, Connecticut, 06268. A single-crystal study of a sample of barium tungsten lithium oxide, supplied by Dr. T. Negas and identified as Ba₅W₃Li₂O₁₅, confirms the |(5)|(5)| layer stacking scheme (Zhdanov notation) for the ten BaO₃ layers per unit cell. Pairs of face-sharing MO₆ octahedra (M = W or Li) are linked through corner sharing by strings of three corner-sharing octahedra. In these strings of three, the two outer octahedra are occupied by W; but no X-ray evidence was found for the existence of Li in the middle one. The compound has a hexagonal cell of dimensions $a = 5.7614 \pm 0.0008 \text{ \AA}$ and $c = 23.719 \pm 0.007 \text{ \AA}$, probable space group $P6_3/mmc$, $Z = 2$. Its structure was determined from 757 independent reflections, of which 426 were considered observed, collected by automated counter methods, and refined by least-squares methods to a conventional R of 0.064. The X-ray refinement based on the assumption that two octahedral sites in the unit cell are empty suggests formulas such as Ba₅W_{3.2}Li_{0.8}O₁₅ or Ba₅W₃LiO_{14.5} rather than the "ideal" formula Ba₅W₃Li₂O₁₅.

A New Productivity Function and Stability Criterion in Chemical Vapor Transport Processes. K. KLOSSE. Solid State Department, Physical Laboratory, University of Utrecht, Sorbonnelaan 4, Utrecht, The Netherlands. The crystal growth rate in a chemical vapor transport process using a closed system is analyzed on the basis of a one-dimensional configuration. The use of a simplified model of vapor transport enables one to obtain a set of equations yielding the rates of reaction without the need of a complete evaluation of the partial pressure gradients. This linear set comprises as many equations as independent chemical reactions. The effect of finite interface kinetics is formally taken into account. The efficiency of a one-reaction process is given by a function involving the mole fractions of the gaseous species and the stoichiometric coefficients in the formula equation. The features of such a productivity function are discussed. Maximum growth rate is achieved if the gaseous components are present in stoichiometric quantities. The concept of the productivity function is illustrated by means of chemical vapor transport systems involving binary and ternary gaseous phases. Proceeding from a two-phase source

material stability criteria are given which define stable one-phase and stable two-phase crystal growth. The kind of deposit may be changed by altering the amount of transporting agent. It is shown that limited interface kinetics favors a two-phase deposit.

Structural Chemistry of $Sr_3Cr_2WO_9$, $Ca_3Cr_2WO_9$, and $Ba_3Cr_2WO_9$. D. BALLUTAUD-HARARI and P. POIX. E.R. 83 C.N.R.S., Laboratoire de Chimie Minérale, Batiment 420, Faculté des Sciences, 91406 Orsay, France. We have studied the preparation and crystallographic structure of three perovskite-type compounds: $Sr_3Cr_2WO_9$, cubic, lattice parameter of which is $a = 7.812 \text{ \AA}$; $Ca_3Cr_2WO_9$, tetragonal, lattice parameters of which are $a = 5.408 \text{ \AA}$ and $c = 7.635 \text{ \AA}$, and $Ba_3Cr_2WO_9$, hexagonal, lattice parameters of which are $a = 5.691 \text{ \AA}$ and $c = 13.957 \text{ \AA}$. We have compared these three structures, and shown the relations between the dimension of the alkaline-earth metal and the existence of the different structures.